Health and Medical Inspection

OF

School Children

BY

WALTER S. CORNELL, M.D.

DIRECTOR OF MEDICAL INSPECTION OF PUBLIC SCHOOLS, PHILADELPHIA; LECTURER ON CHILD HYGIENE, UNIVERSITY OF PENNSYLVANIA; DIRECTOR OF DIVISION OF MEDICAL RESEARCH, NEW JERSEY TRAINING SCHOOL FOR THE FEEBLE-MINDED, ETC.

Illustrated with 200 Half-Tone and Line Engravings, many of them Original

PHILADELPHIA
F. A. DAVIS COMPANY, PUBLISHERS
1912

Philadelphia, Pa., U. S. A.
Press of F. A. Davis Company
1914-16 Cherry Street

TO THE MEMORY

OF

MY FATHER

WATSON CORNELL

PREFACE.

The twentieth century has been marked by an unprecedented interest in the welfare of children, comparable indeed to the great periods of inspiration in art, in religion, and in letters which have occurred at different times in past centuries. Today the educator and the social worker receive instruction in health matters as an essential part of their training. Municipal authorities are endeavoring to reach parents by school inspection, by visiting nurses, and by public lectures and exhibits. Physicians, heretofore blind or curiously indifferent to the diseases and defects found in children past the period of infancy, have been awakened by medical inspection in the schools. The revelation that defects of the eye, the nose and throat, the teeth, and the mind may profoundly influence the general health of the individual bids fair to break down the artificial barriers which have been raised between the so-called specialties and general medicine.

The aim of this book is to present a practical exposition of the work of medical inspection, born of the examination of some 35,000 children, and to give to physicians and teachers a survey of medical practice as it relates to children of school age.

The subject-matter of a textbook is necessarily scientific and philosophical rather than emotional. I have endeavored, however, to provide enough illustration to give realism and human interest. A review of the work of medical inspection in different localities is not attempted. This has been done already by Gulick and Ayres of the Russell Sage Foundation, and by the United States Government, better than the author can do it. Only general information on the treatment of diseases and defects is given, as the writer does not care to participate in home medication based on incorrect diagnosis.

Endeavor has been made to preserve unity of plan and purpose throughout the book. A primary division has been made into Parts and Chapters. In those of the latter which deal with physical defects a secondary sequence of (1) definition, (2) cause, (3) prevalence, (4) evidence and diagnosis, (5) results, and (6) treatment has been followed as much as possible, the object being to train the reader and to facilitate the finding of desired information.

Throughout six years' experience as a medical inspector I have been fortunate in enjoying the friendship of my colleagues, and also that of the numerous teachers whose pupils I have examined. Many of the studies quoted in this book were made with their active assistance. Professor Vincent B. Brecht with characteristic generosity loaned an extra fine camera for the procurement of illustrations. Miss S. Blanche Jobes gave most valuable assistance in the preparation of the Section on Medical Inspection and the Chapter on the Prevalence of Defects and Diseases. Miss Helen Winstanley very kindly made the drawings illustrating the action of lenses and the general plan of the eye. Mr. Edward R. Johnstone, Mr. J. Prentice Murphy, and others unmentioned here evidenced a friendship which the author deeply appreciates.

2018 Chestnut Street,
Philadelphia, Pa.

CONTENTS.

I. MEDICAL INSPECTION.

II. HYGIENE.

III. DEFECTS AND DISEASES.

THE EYE.

THE NOSE AND THROAT.

THE EAR.

THE TEETH.

THE NERVOUS SYSTEM.

MENTAL DEFICIENCY.

THE SKELETON.

NUTRITION.

THE SKIN.

SPEECH.

INFECTIOUS DISEASES.

PREVALENCE OF DEFECTS AND DISEASES.

LIST OF ILLUSTRATIONS.

I. MEDICAL INSPECTION.

FIVE principal health agencies exist in our public school system, namely: school hygiene, personal hygiene, physical education, medical inspection, and municipal medical charity.

Of these school hygiene is by far the oldest. Until the last few years it has been an academic subject rather than a practical force. In normal schools the course of study includes consideration of ventilation, room space, and school furniture; but a few book sentences soon forgotten mean little without the actual measurement of rooms, judgment of the atmospheric conditions existing, and observation of children as they sit in their seats at work. In this respect the study of school hygiene has been paralleled by the study of "physiology," which has taken into consideration the vital and innermost organs, but has neglected to instruct the teacher to actually look into the child's mouth.

Lacking the assurance born of medical knowledge and authority the few votaries of school hygiene have been timid, and the teacher who, previous to the present awakening, has stood out boldly for proper health conditions in her school against the treasurer of the school board, or even against a lazy janitor, is unknown to fame.

Personal hygiene has been taught to children during the last two or three years in a manner and with a force never approached before. The value of personal cleanliness, of the proper care of the teeth, and of exercise; the nature of infectious disease, and the deleterious effects of alcohol, coffee, tea, and tobacco have been taught vigorously. The subject of temperance has come to be understood in its broad scientific aspect. The teaching of sex hygiene has been advocated, and its feasibility is now being determined by local experiments.

Physical education represents the first practical endeavor to enforce the observance of personal hygiene. Its scope is necessarily limited to the problems of muscular exercise. In a sense it has been a forerunner of medical inspection, the principal difference between these two activities being that physical

education aims at the preservation of health, and medical inspection at its recovery. The one weak spot in the work of physical education as ordinarily practised is the lack of medical knowledge on the part of the instructor. For this reason corrective exercises for particular defects, direct specific purpose, and the exemption from drills of invalid children have been largely lacking. In this particular province is found the correlation of the work of the school physician and the physical instructor, the latter carrying out the recommendations of the physician.

Medical inspection has made the subject of health an important one in the school system. Recommendations made by physicians cannot be ignored by school boards or teachers because the responsibility for human life has thus been placed squarely upon them. The medical inspector may or may not be an efficient one; it is the fact that he is a practising physician, which makes his advice prevail where the same advice by the teacher would be ignored. If in addition to the prestige of medical authority we assume the existence of efficiency on his part the benefits already mentioned are multiplied many times.

Municipal medical charity in connection with medical inspection signifies free eye-glasses, dental treatment, medical treatment, outings in the country, and free meals. Some of these are more directly connected with the medical inspector's work than are others, but for convenience sake and to emphasize their common social significance they may all be considered together.

The school nurse's principal function is to carry out the recommendations of the medical inspector, and the subject of school nursing is, therefore, considered under the general subject of the correction of defects.

THE OBJECT OF MEDICAL INSPECTION.

The specific objects of medical inspection are:—

1. The detection and correction of physical defects.

2. The detection and exclusion of cases of parasitic and contagious disease.

3. The maintenance of good hygienic conditions in the schools.

4. The diagnosis and treatment of cases of mental deficiency.
5. The correlation of medicine and pedagogy in order to produce the maximum of efficiency in the school system consistent with the preservation of health.

ADMINISTRATIVE CONSIDERATIONS.

APPOINTMENT OF MEDICAL INSPECTORS.

In the United States, at the present time at least, no uniformity exists in the method of appointing medical inspectors. Political influence; personal acquaintance with the health board or school board; fraternal, social, and various other influences, which naturally act as levers to any unprotected "good thing," determine the majority of the appointments. The recent origin of the work, the reluctance of the authorities to spend money, the uncertain tenure of office, the controversy as to whether medical inspection is "health work" or "school work," the lack of system and supervision due to the natural ignorance of non-medical school directors, plus the lack of standard literature on the subject, have made the work unattractive to first-class men already making a fair living, and have conspired to make the average medical inspector not quite an ideal one.

EFFICIENCY IN MEDICAL INSPECTION.

The degree of efficiency attained in medical inspection depends partly upon the individual inspector and partly upon the prescribed system under which he works.

Individual Efficiency.

The inspector's individual efficiency depends, furthermore, upon his medical skill and his personality. By the former is meant his knowledge of general medicine, of the diseases of childhood, of the elements of the specialties—"eye, nose and throat, ear, teeth, nervous system, and skin," and, finally, knowledge of the relation which defects of one part of the body may bear to defects in other parts. It may be remarked that all this is ordinary medicine, yet, since our medical colleges do not give a special course of study in the diseases of children of

school age, it is a fact that the average physician is poorly equipped to do medical inspection work until actual experience in the schools has opened his eyes. Inspectors have been known to omit everything but the points covered in the routine examination and, perforce, recorded; others through laziness to test the vision of both eyes together and to omit the test of hearing altogether, and others to fail to record the most obvious defects.

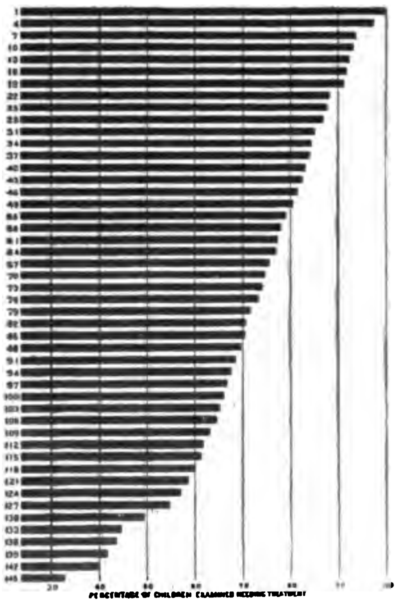


Fig. 1.—Diagram showing variations among medical inspectors in finding physical defects. Manhattan—all schools.

Conversely, the writer recalls two inspectors who, because of special knowledge of the nose and throat, and the eye, respectively, found defects in these organs in almost all children examined by them. One of them is a firm advocate of the procedure of examining every school child's eyes under the influence of atropine, which would of course show four-fifths of all eyes to be more or less imperfect, but would be an uneconomical, almost useless, and prohibitive undertaking.

The general standard of medical inspection, however, has been satisfactory, and every large medical inspection corps

numbers among its members some of the brighter young men of the community who are active in medical affairs generally and valuable to the public service.

Personality has been mentioned as the second factor in the inspector's efficiency. Prominent among his valuable qualifications in this respect are tact with teachers, parents, and children, willingness to work, and general professional conduct

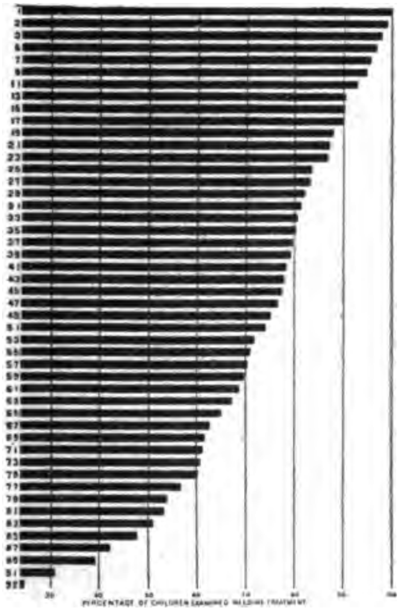


Fig. 2.—Diagram showing variations among medical inspectors in finding physical defects. Brooklyn—all schools.

which tends to place the work of medical inspection on a high professional plane. Much more might be said in this connection, but the perusal of the entire chapter on the work of medical inspection will impress upon the reader the importance of the physician's personality without a special dissertation here.

Proof that great differences exist in the work of different inspectors was first shown by the Bureau of Municipal Research of New York City, which joined with the Health Department in a friendly investigation of the latter's school inspectors. In a most interesting booklet ("A Bureau of Child Hygiene,"

1908) is given an account of the examination of the different inspectors' records, with illustrative charts. I quote from this booklet the following:—

"The establishment of the division of child hygiene (in New York City) followed upon a series of co-operative studies and experiments by the Department of Health and the Bureau of Municipal Research. A study, conducted in the spring of 1908, of the prevailing methods and results in the examination of school children for non-contagious defects

Fig. 3.—Diagram showing variations among medical inspectors in the same school in finding physical defects. Selected schools—Manhattan and Brooklyn.

demonstrated clearly that *the accuracy of the examinations was open to serious question*, and that *no adequate methods had been worked out for securing the treatment of children discovered to be defective.* Inspectors examining in the same schools rendered reports differing as widely as by 100 per cent. in the number of children found defective.

"In order to prove the work of the department's inspectors in this respect, several tests were applied. For the two largest boroughs, Manhattan and Brooklyn, a chart was made showing for the period, September 1, 1907, to January 31, 1908, the total examinations by each inspector and the number and percentage reported by him to be defective. The results showed *among inspectors a wide variation in per-*

centages found defective, from 100 per cent. to 32 per cent. in Manhattan, and from 100 per cent. to 18 per cent. in Brooklyn (see accompanying illustrations and tables). Of this variation a part was, of course, attributable to actual differences among the children examined. That such differences could be so great, however, was hardly to be believed.

"The next step, therefore, was to select certain schools where more than one inspector had made examinations during the period. It was assumed that conditions in each school are nearly uniform, and that

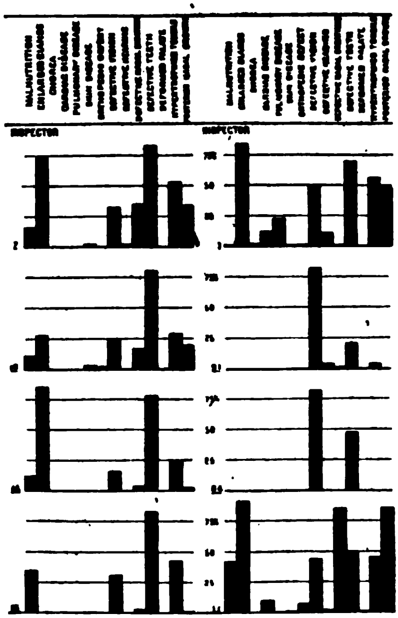


Fig. 4.—Diagram showing variations among medical inspectors in the defects found. Percentage found, each defect.

therefore any considerable variations in reports must be due to variations in the inspectors' methods. A chart similar to the former was drawn, from which it appeared that discrepancies as great as between 32 per cent. and 92 per cent. and between 43 per cent. and 84 per cent. occurred in the same schools. In other words, *two inspectors examining different children in the same school reported results differing by 100 per cent.*

"Not only in the total number of children needing treatment, but in the kind of defects found is there room for variation, some inspectors tending to find one or two particular defects, other inspectors to find other defects. To discover the extent to which this might be the case,

one hundred consecutive cards were taken at random from the file of each inspector and a chart was prepared showing for each inspector the number of instances reported of each kind of defect. As may be observed, *some inspectors found a few instances of many defects, some found many instances of a few defects, while others found instances in abundance of the whole list of defects.*

"All of these statements were based on the regular records of the department. To complete the case, the department was requested to assign special inspectors for the purpose of re-examining children who had first been examined by the regular school inspector. The work of 15 inspectors in 15 schools was thus tested, an average of 20 children being re-examined for each. A glance at the following columns reveals the discrepancies already mentioned, with one additional—in the *individuals* reported defective, even when the *number* so reported was nearly in agreement:—

VARIATIONS AMONG MEDICAL INSPECTORS (OF NEW YORK CITY) IN FINDING PHYSICAL DEFECTS.

Re-examination of the Same Children.

Defects	Found by Original inspector	Found by Special inspector	Individuals on whom inspectors were agreed
Malnutrition	28	10	10
Anęmia	22	11	7
Enlarged glands	119	126	84
Nervous disease	4	1	1
Cardiac disease	5	8	4
Pulmonary disease	13	2	2
Skin disease	10	7	3
Orthopedic defect	9	12	[illegible]
Defective vision	72	101	51
Defective hearing	6	9	2
Defective nasal breathing	34	20	15
Defective palate	22	16	14
Defective teeth	161	206	147
Hypertrophied tonsils	107	127	80
Adenoids	70	96	49

"The conclusion was therefore unavoidable that *physical examinations as conducted have been far from uniform,* and that *some plan must be devised for standardizing them.* It is, of course, to be expected that diagnoses will disagree to some extent even in the face of effort to the contrary; but this disagreement must be confined within as narrow limits as possible if the department's reports and notifications are to have a reputation for reliability."

It is well worth while to know what teachers think of the manner in which medical inspection is conducted in their schools. To read the glowing accounts of magazine writers, who, of course, sketch the ideal and have only superficial and second-hand knowledge of the subject, one would imagine that the human race is in a rapid process of marvelous physical development. It is from such sources, rather than from those who actually know, that the average person is informed.

First of all, I wish to state that the opinions of teachers here expressed are mostly from teachers living elsewhere than in my own city of Philadelphia. Not that medical inspection in Philadelphia is perfect—far from it; but from personal visitation and observation I can testify that it is far superior to that in most cities and as good as that in any other large American city.

One school principal recently remarked:—

"When Dr. —— was medical inspector we had every child in the school thoroughly examined, and almost every defect found was corrected. I was interested, the teachers were interested, and the nurse was interested. Since Dr. —— has been our inspector we are practically doing nothing. When the teachers send children here to the office for diagnosis and treatment, he does nothing for them and doesn't seem to care. Now *they* don't care and they never send them down any more —and I must say that *I* don't care, either."

Another principal writes:—

"I have received a communication asking for an expression of opinion on the subject of medical inspectors and medical inspection.

"I have had experience with four medical inspectors during the past five or six years. Of these, one was incompetent, one was lazy, and two were faithful and efficient. The work of all these inspectors, however, has been rendered futile through lack of a system of following up individual cases to see that recommendations were complied with. Such statistics as I have seen show thousands of recommendations for treatment, but I have never seen any records which show to what extent the department has brought about relief of the physical handicaps of school children. The efficiency of school inspection should be measured in terms of actual accomplishment and not by the number of opportunities presented. The success of the work depends largely upon the school nurse, whose business it is to follow up cases to the home and the dispensary, and see that the recommendations are complied with. As few of our schools are supplied with nurses, it is evident that a large part of the work of medical inspectors comes to naught. So far as I am able to

observe, the nurse and the medical inspector, whose work should be definitely correlated, view the work at entirely different angles: the physician concerns himself solely with the detection of contagious disease which might menace the community, while the nurse interests herself in the welfare of particular children and sees that the physical defects which retard their progress are corrected.

"There have been too frequent changes in the procedure of the medical inspectors, which have resulted in confusion and misunderstanding. At times children coming in contact with contagious diseases are excluded from school for long periods, while at other times these same sources of contagion are ignored. At present the medical inspector is working under a new system, by which, instead of receiving such cases as are referred to him, he goes directly to the class room to detect disease, and so relieves the grade teacher from making the diagnosis. Under this arrangement the visits of the inspector can only occur at intervals of about one week. For the greater part of the time the schools are left unprotected, and the duties which daily devolved upon the medical inspector are now discharged by the principal or by the school nurse, although the rules of her department forbid her to make a diagnosis.

"It would seem that the school nurse and the medical inspector should be brought under a common authority so that all conflict of function may be avoided. If the purpose of school inspection is to conserve the general health of the community, it should be directed by the Board of Health; but if the welfare and progress of the school child is of first concern, the physical conditions which advance or retard his progress become an important element of school training, and as such should fall within the province of the Board of Education."

Another principal writes:—

"The value of medical inspection in the schools as I have observed it depends almost entirely upon the interest and efficiency of the individual inspector. In other words, the system, whether through lack of organization or through an insufficient number of inspectors, is so lax as to permit wholly ineffective work on the part of the inspectors who are disinclined to do much work. My chief criticisms of the system are:—

"1.—The time that an inspector spends in a school is too brief to do effective work.

"2.—Consequently, the inspector has practically no cases presented to him for investigation except those which have already been diagnosed by the teacher and sent to him for what is practically a mere confirmation of the teacher's suspicions. Since these are the cases detected by a layman inexperienced in medical affairs, they are nearly always only the serious defects that need immediate attention. Minor defects, how-

ever important, escaping the attention of the teacher are not examined by the inspector.

"3.—The inspector has no authority to treat cases, however serious, that are sent to him in school. Since this is true, and because of the conditions stated in No. 2, far more effective work can be done by a nurse than by a medical inspector.

"These criticisms, it will be observed, chiefly concern the system under which our medical inspection is conducted. I have seen the case of the inspector who observed the letter of his instructions and was of practically no service to the school, while, on the other hand, we have had medical inspection from physicians who were *willing to inspect* and who performed services beyond the limitations put upon them by the system under which they are operating, and their work has been highly satisfactory so far as it has been possible for them to work with the time limitations set upon them."

A district superintendent writes:—

"The school medical inspectors whom I have observed at work have been, as a rule, earnest, skillful physicians who knew their work and did it. Their influence on the teaching force and in the community has been excellent. Teachers and school officers have had their attention called to conditions which menaced the health, happiness, and progress of the children in such a way that improvements in the care exercised by teachers have increased greatly. The public has more fully appreciated its duty in helping to prevent the spread of contagion and also in helping to provide such conditions that health and strength might be conserved. Children now come to school more nearly clean, more nearly properly clothed, and more nearly fed than I have ever seen them.

"I attribute this great improvement almost entirely to the tactful, persistent attention the school medical inspector has given to disease, dirt, and unhealthful conditions. He has shown the teacher and the public that health and happiness are both within our grasp if we but give heed."

A principal writes:—

"Medical inspection is undoubtedly productive of good results, since it places the responsibility for the maintenance of health on the professional man, where it belongs. When parents realize that every child, including their own, is regularly examined there will doubtless be a change in the whole community. Up to the present time there has been no decrease in the number of contagious disease cases occurring, but this may be due to the many moving-picture shows recently established, all of which in this neighborhood are in small, crowded accommodations.

"The limitations of our system are, first, that the medical inspector only *recommends* treatment, but cannot follow up his cases, and, second, that he is kept busy carrying out instructions that have apparently been made for the purpose of keeping him busy. It is not fair nor wise to destroy the individuality of a good man,—a man interested in his work. The incompetent man is not easily affected by rules, anyway.

"There should be a place in medical inspection for the care of nervous children. This seems now to be a weak point in the system.

"A nurse is often needed in our school, which contains mostly poor children. Recently we excluded a foreign 13-year-old girl because of an unclean head. Her parents were only too glad to have her at home. At the end of ten days the attendance officer ordered her back again. She was excluded again the same session—in and out again repeatedly. In another family 3 children had scabies. They were reported once a week, but no improvement. Finally the Visiting Nurse Society visited the home and got the children back into school in less than ten days."

Efficiency in System.

If one man only be employed by a community, he should prosecute his work in a systematic manner, regularly following a schedule and rendering reports to the authorities. Thereby he avoids both actual and suspected laziness and inability. In too many small towns the inspector, once appointed, is left to his own devices, and becomes slovenly simply from lack of competition and supervision.

If several inspectors be employed by one community, the need of system becomes very apparent.

The following factors determine largely the efficiency of medical inspection:—

1. The medical skill and the personality of the individual inspectors (already mentioned).

2. Reasonable tenure of office and adequate compensation for medical inspectors (already mentioned, pages 3 and 152).

3. Co-operation of parents of children, either by their education, persuasion or compulsion.

4. Interest and co-operation of the school authorities and teachers in (*a*) the medical inspection of children, (*b*) matters of school sanitation.

5. The employment of home visitors, usually nurses, and

the existence of free medical and dental dispensaries (see pages 89 and 94).

6. Organization and conduction of medical inspection as an essential part of health and educational work.

7. Special medical training of the medical inspection corps.

8. Supervision of the work of the corps by a central authority.

9. Proper apportionment of the inspectors' time to (*a*) examination of children, (*b*) records, reports, and other clerical work, (*c*) journeying between schools.

10. Harmonious relations between the department of medical inspection and the medical profession.

Passing by the first five of the factors above enumerated for the reason that they are discussed fully elsewhere, and taking up the matter of the recognized importance of medical inspection work, it is well to emphasize the necessity of a rule that neither the medical inspector's private practice nor the other departments of educational or health work should be allowed to disorganize the work by causing irregularity of school visits. Just so long as school inspectors are ordered away from their work to combat occasional epidemics of contagious disease, or approaching school examinations influence the school authorities to discontinue physical examinations temporarily, will the work of school inspection suffer. Of course, rare occasions may arise necessitating the use of the medical inspectors outside schools, and it is reasonable to defer the notification of parents for a week or two in cases of chronic defects, if the principal so desires. The general feeling seems to be that the school work is best done by men assigned solely to this phase of health work, and many of our large cities are following this plan. An additional argument in its favor is, that school children examined by an inspector who is not called upon to report contagious disease are not exposed to contagion. Personally, I know of no case of contagious disease transmitted by a member of the Philadelphia corps during the years 1905, 1906, and 1907, when the inspectors handled both school and contagious work. There was endless criticism from the medical profession however, constant issuing of cautionary notices by the chief inspector, and frequent withdrawal of inspectors from school work because of

necessary contact with cases of diphtheria and small-pox. The latter disease, be it remembered, was epidemic in Philadelphia from 1902 to 1905. The separation of the medical inspection corps into two squads for school inspection and the handling of contagious disease, respectively, which was done in 1907, has always been regarded by the Health Department as a wise measure.

Whether the controlling authority of medical inspection shall be the health or the educational department is a mooted point. Of course, so long as the work is well done and harmonious relations exist between these two, the question is immaterial. In New York and Philadelphia, for instance, the Department of Health conducts the medical inspection and the Board of Education willingly accepts the service, which costs it nothing. In Philadelphia the Department of Health does not furnish the school nurses. They are paid by the Board of Education, as are also the instructors in physical education. In Massachusetts and Vermont the teachers are required to assist in examining children, and, in some cities at least, the educational authorities control the whole medical inspection work. In New Jersey the legislature recently passed a comprehensive act requiring the local boards of education to employ medical inspectors. The arguments in favor of health control are that a medical matter should be supervised by physicians, and that contagious cases, at least, are a matter of public health. The arguments in favor of educational control are freedom from political influence, and the close relation of physical health to educational efficiency. The proposition has been made to place the systematic physical examination of children under the school authorities, keeping the health authorities in control of contagious disease. In this way the school inspector, the nurse, and the physical instructor are compelled to co-operate by reason of one source of authority. No doubt the question will ultimately be worked out in the crucible of experience.

As to special training of medical inspectors for school work, the offering of appropriate courses by our medical schools only waits for a demand for such special instruction. The University of Pennsylvania offers a short course in its summer school, but, so far, only two medical inspectors have availed

themselves of it, the other students being teachers. I must admit that up to the present time a special medical certificate has not appeared in the least useful to any physician desirous of securing a medical inspector's position. Some of our larger cities have endeavored to raise the efficiency of their medical inspection corps by providing special lectures and clinics on the subjects most important to the men. In Philadelphia an excellent course in the acute contagious diseases and the skin diseases was provided by the specialists of the Department of Public Health and Charities. Another course, covering the eye, was also well given. Other miscellaneous lectures, on orthopedics, neurology, *et cetera,* failed because the lecturers did not grasp the needs of school inspectors in the specialties.

Supervision of the work of the corps by a central authority is absolutely necessary to the proper conduct of a large system. One has but to read the account on page 6 of the remarkable variation in the findings of different inspectors when examining the same children to realize the truth of this statement. A supervisor can satisfy himself easily and quickly of the regularity of attendance, industry, and medical skill of any inspector by occasionally telephoning to the school indicated on his schedule and talking to him, by counting his completed physical record cards, and by calling in and re-examining some of the children that have been inspected. The practice prevails in some cities of demanding duplicate or even triplicate reports, the idea probably being that if the inspector falsifies his accounts he will lack the brains to do it in duplicate. If checking up of the inspector's work be the object in view, this procedure is an expensive waste of time. If we wish to know whether or not the children have been examined it is obvious that we should look at the children, not at statements.

The best disposition of records, bearing in mind both economy and efficiency, is discussed on page 45.

The proper apportionment of the inspector's time to the examination of children, the writing of records and reports, and the traveling to and from schools is a most important question. It will be discussed in the next section, bearing on the proper number of inspectors per school population, but in this connection it is well to remind those interested that it is cheaper

to pay two inspectors small sums for inspecting the children in schools near to them than it is to pay one inspector a double sum and have him consume his salary in walking the streets of an extended suburb, or traveling long distances in the country. It is also cheaper to use a simple plan of account-keeping, with no duplications, since a physician's time is theoretically worth more than a clerk's time. On the other hand, the idea of examining children continuously for hours at a time is impracticable. Any one who has examined children for two hours continuously, using the eyes to watch the test card, breathing the expired air of children at close range, sitting down to write and getting up again to look, questioning and directing constantly, without relaxation, can testify that the strain is as severe as lecturing, and much more severe than teaching. If an inspector be employed for the whole school day, it is necessary to offer him some diversity of work and diversion of mind, or a horrible headache and mental exhaustion stops him automatically. In such case it is better to provide for 20 "routine examinations" per day, and expect the examination of 30 or 40 other children sent down by the teachers for miscellaneous complaints in other schools subsequently visited. If all the schools visited be in such a good neighborhood that very few children are sent down to the office, it is feasible to extend the routine examinations to 30 or 36 per day by examining 10 or 12 children each in three different schools, such a procedure affording a rest period between schools.

Harmonious relations between the medical inspectors and the other physicians of the community are essential. It is impossible, as long as medical inspectors engage in private practice, for them to avoid the reputation of building up a clientele through the lever of their school work. On the other hand, we are as yet as far from the custom of engaging municipal inspectors for their whole time as is the case in the government medical service; so that this condition must be faced and adjusted satisfactorily. The solution appears to lie (*a*) in the use of teachers, nurses, and social visitors for personal interviews with parents. That such personal interviews double results in the correction of defects is undoubted. (*b*) The medical inspector should keep his personality as much as possible in the background by signing

parents' notices without his address, and by living outside of his district when this is not an obvious inconvenience. (*c*) A better care by practising physicians of the children whom they regard as their patients. At the present time the average family physician appears to claim proprietary rights over children whom he has not bothered to look at for three or four years. If a medical inspector notifies a parent that his child has adenoids, decayed teeth, and very defective vision, the claim of any physician that he is the "family doctor" may well raise the point that he has criminally neglected his little patient.

Just so long as the practice of preventive medicine by the family physician is discouraged by the profession on the foolish ground that it is "contract practice"; just so long as our free dispensaries are conducted as agencies to build up private practice for their chiefs under the guise of charity, and just as long as medical inspectors are compelled both to examine the juvenile public and also privately practise medicine, will the question of ethical rights be a disputed one. The best course possible at the present time is to work along the lines above advocated, warning the medical inspector that any *proven* attempt on his part to "work" his public position for extra private gain will result in his dismissal.

PROPER NUMBER OF INSPECTORS PER SCHOOL POPULATION.

The number of inspectors required depends upon the number of children and the distance between the schools. In scattered rural communities it is often most economical to employ a doctor in the immediate vicinity of each school at a low salary, thus eliminating the waste of time spent in travel between schools. In the larger communities, where the schools lie close together, it is better to employ the whole time of the physician, thereby keeping the corps of inspectors small with a maximum of efficiency.

The time required for efficient medical inspection of the schools in a given community should be calculated from the factors of (*a*) school population, (*b*) number of schools, (*c*) their distance apart, (*d*) the social character of the school population. These determine the time required for the physical

examination of the children, and their protection from contagious disease.

The routine physical examination of each child, including the essential details (see page 37), but not including records of height and weight, nor heart and lung examinations, should consume five or six minutes. The number of miscellaneous cases sent by the teacher to the inspector varies remarkably. In the large city schools containing children of the well-to-do, 3 or 4 at a visit is probably more than the average. In a small country school 1 child per visit would be a high estimate. For instance, given a school of 30 or 40 children who have been already examined thoroughly by the inspector and have procured necessary treatment, the probabilities are that the inspector may visit the school every day for a month and not have a single case brought before him by the teacher. The large slum city schools, on the other hand, present very exceptional conditions. In their case the inspector may be held from one to three hours by a great number of children suffering from skin diseases and other effects of neglect. The writer remembers that on his first visit to one of these schools, the Mount Vernon, at Third and Catharine Streets, Philadelphia, 46 children were sent down to the office by the teachers for miscellaneous complaints. At the Wharton School the number has several times exceeded 50.

Even if the children of a school have been systematically examined, routine visits should be afterward made to preserve system, afford the teacher opportunity to ask advice, and to inspect the sanitary condition of the school building.

The number of inspectors required[1] when each inspector

[1] Recounting my own experiences,—(1) In the years 1904 and 1905, the examination every eighteen months of 3500 American children of fair social station in 4 schools situated 5 blocks apart, with a daily visit to each school to look over miscellaneous cases reported by the teachers, required three hours' actual school work. (2) At a later period, the same quantity and quality of work with the same number of children in 6 schools, situated closer together, 3 of the schools comprising 2200 children of well-to-do parents, and the remainder, 1300 poor whites and negroes, required about three and one-half hours daily. (3) In the year 1908 the assignment of a slum district containing 9000 children, most of them Italians and Russian Jews, in 9 schools permitted a visit to each school every alternate day. The miscellaneous

works, say, four hours a day may be set down as 1 inspector for each 6000 children if the children are clean and of good social station, and as 1 inspector for each 4000 children if the latter are of the poor, ignorant, and foreign class. If the schools are small and scattered, the time lost in transit between them will also reduce the number of children to 4000. These are maximum figures and will in some instances barely allow of a visit to each school every day if the whole mass of children is to be systematically examined every two years.

The number of cases seen by the medical inspector depends as much on his own efficiency as upon the size and distribution of the school population. The inefficient inspector visits his schools just as often as he is compelled to by his regulations, but no more. Beyond the routine signal bells announcing his presence, the teachers are never made to know of his existence, and soon the "doctor's bell" rung through the school has about as much awakening influence as the trolley gong on the street.

The efficient inspector carries on his work with the aim of securing the co-operation of principal and teachers, parents, and children. The cases are followed up with the idea of producing results. Under this stimulus the school wakes up. Teachers see the improvement in the pupils after treatment. Children themselves report their discomforts, knowing that advice as to relief may be obtained at once. A school inspector who thus handles his work becomes one of the greatest forces in the neighborhood embracing his activities.

---

cases, numbering about 60 each day, required four hours or more, thus giving but little opportunity for systematic examination of the children. As a rule, however, about 20 of the latter examinations were made daily. While two faithful nurses assisted in the accomplishment of very good results, the fact remains that the examinations were mainly of a miscellaneous character, and these results were only obtained by the utmost effort and hurry, resulting after two years in a breakdown from overwork. There is no doubt that in the slums the number of children to a physician should not exceed 4000 or 5000, with a nurse to every 3000 or 4000 children.

FREQUENCY OF VISITS.

There is no doubt that in the ideal system the medical inspector visits his schools daily at approximately the same hour. A rigid system and a daily call for patients waken the teachers to their responsibility, and this daily search by them for cases of physical defect, skin disease, or sore throat soon increases their power of observation to a wonderful degree. Any working plan in a large city not entailing these daily visits can be justified only on the ground of economy.

Realizing that the endorsement of infrequent visits may do harm to the cause of medical inspection by reason of misunderstanding, it should be stated in justice to the public treasury that daily visits to very small suburban schools are a non-justifiable expense. It is true that a case of scarlet fever or some minor contagious disease may develop on one day as well as another, but experience has shown that such cases are rare in these schools, and that a daily incidental visit by the medical inspector is usually a fruitless errand. Visits at intervals of three or four days are in these cases sufficient, and as the schools are small—usually 1 or 2 classes—the inspector, by personally visiting each room, can keep the teacher alive to his work. The systematic examination of these children is of course but a brief task.

I also believe that the ordinary school does fairly well with visits by the medical inspector on every other day only, and therefore that such a system is justifiable where the item of expense is a pressing one. Certainly, if the number of schools assigned a medical inspector be so great as to force a choice between daily visits for miscellaneous cases and visits for the purpose of thoroughly examining all the children for physical defect, the proper course is to compromise in such manner that the children be systematically examined at least two or three times during their school careers.

Any system of medical inspection which provides for the visiting of large city schools less frequently than on alternate days should be condemned.

FREQUENCY OF SYSTEMATIC EXAMINATIONS.

How frequently should a child be systematically examined? In the beginning of medical inspection, an annual routine examination was the objective, but nowhere, so far as I know, has it been accomplished. Taking the five primary physical defects of poor vision, nose and throat obstruction, deafness, decayed teeth, and poor nutrition, and considering each in its turn, it seems to me that the examination of each child every two years is sufficient, provided the school record of defective children is gone over each September and an endeavor made to secure the treatment previously recommended if this has not been obtained. In this way the known defectives receive an annual examination.

An experienced examiner will require four or five minutes for each child. It is the custom in our larger cities for the medical inspector to first visit each school on his list for the examination of miscellaneous cases and at the last school visited to make a systematic examination of from 20 to 30 children.

By this method, if the proper number of school children be assigned to his care, every one is systematically examined and the results recorded on his registration card every two years.

No system looking to the systematic examination of more than 30 children daily is feasible. The eye-strain attendant on vision-testing, the amount of vitiated air inhaled during throat examinations, and the general activity required impose a limit upon the examiner at this point.

COMPENSATION OF MEDICAL INSPECTORS.

1. *For Whole Time.* A medical inspector receiving $2500 or more should not engage in private practice. His medical work outside the schools should be limited to scientific study or free hospital work. If the employment of medical inspectors were placed on the same high and dignified plane as the employment of medical officers in the government service, that is to say, if the assumption were made that a school physician should be of proven general ability, should be especially instructed in

his subject, that the *whole time* of such an officer should be worth from $2500 to $5000 a year, according to his length of service, and the tenure of office be made reasonably permanent, a sort of medical inspection not known at the present time would prevail. The salary just mentioned would not be excessive, is about equal to that in the government medical service, and is not considered to be a large income for a first-class practising physician. Nor would this be considered an excessive salary for a teacher or sociologist who had made the same educational preparation demanded of a physician. In Philadelphia the superintendents (secretaries) of the regular charitable agencies receive from $2500 to (an equivalent of) $7000 a year. The 10 district superintendents of schools receive $3000 a year each, and the male grammar school principals $2500. The latter are men who have received high school training, plus a two years' course in the Philadelphia School of Pedagogy. Many of these men complain that $2500 is insufficient for their needs. In New York City the teachers' salaries are higher than in Philadelphia.

On the other hand, the Philadelphia medical inspectors receive $1400 a year with no allowance for transportation and other expenses, which places the net income at about $1200. They are instructed to report at the school at 9.15 in the morning, and work until the close of the school day at 3.30.

The average community employing a medical inspector at the present time pays him a sum ranging from $100 to $500 a year, with the time requirements very indefinitely stated (see Dr. Ayres's figures, page 152, and the Harrisburg special school report of April, 1908). Such salaries naturally produce corresponding returns (or less). If the average school teacher were paid, say, $300 a year and told to earn the rest of his living elsewhere, a parallel state of affairs would exist in the domain of education.

2. *For Partial Time.* A medical inspector receiving $1000 or less per year should give a certain number of hours daily to his school work with the absolute obligation to make his scheduled school visits, but with some latitude as to the hour of his arrival. For instance, an inspector giving four hours' work daily should report before 10 o'clock and remain in school for

the remainder of the school day. All clerical work in the nature of summaries and reports should be done at home without extra compensation.

The great difficulty in medical inspection of this sort is that an operation or a visit to a patient is apparently more remunerative than the same time spent in school. This tempts the inspector to slight his public work for the sake of a few hundred easy dollars, thereby greatly reducing his efficiency. If the outside professional duties of a medical inspector cause him to miss 5 per cent. or more of his routine visits, he should resign, provided another competent physician can be secured. A large private practice and the public service are incompatible.

There is an axiom that one generally gets what one pays for. If the health board or the school board misappoints and underpays its medical officers a hundred regulations are useless.

The writer has had several requests from country school boards as to the proper salary to be paid a medical inspector *giving only part of his time to the work.* The following rule for calculation works well:—

The inspector should be paid for the hours actually spent in the schools and for the time consumed in going from the first one to the others. If he lives in a reasonable location, but all the schools are distant, credit for an extra half-hour may be included. If the schools are widely separated without good transportation facilities, the inspector should receive $100 a year for the keep of a conveyance, but in such cases the extra credit mentioned may be omitted.

Suppose, for example, the borough of Northampton institutes medical inspection. There are 2000 children in 10 different schools and the total distance between schools is 12 miles. The population is scattered, and therefore contagious diseases except long-apart epidemics of measles and chicken-pox practically do not exist. Under such conditions the inspector can examine all the children in twelve thousand minutes (two hundred hours), inspect all their vaccination marks in ten hours or less, and make a sanitary inspection of each of the 10 buildings three times a year, allowing thirty minutes to each inspection, equaling fifteen hours more. The children sent to him on each visit by the teachers, entailing thereby some extra work, would not

average more than 3 children at five minutes each, and if by the official regulations he visits each school twice a week for forty weeks this would add two hundred hours more to his work. All this would total four hundred and twenty-five hours. With ten months to do this work (except for the stated short visits already mentioned), he would thus average about forty hours a month, each month consisting of twenty school days. Under such conditions a physician could almost arrange his own time to make his systematic examinations, even allowing that an hour is consumed in transit between. Two dollars per hour would therefore be good compensation, and would equal $850 for the year, to which may be added credit for a half-hour's time on each working day (probably about 150 in this case), equaling $75, or if the inspector keeps a conveyance this extra allowance may be made $100. This would make a total salary of $950.

FACILITIES FOR MEDICAL INSPECTION.

The medical inspector should have the use of the principal's room, or a private room, with running water convenient. The examination of children's eyes absolutely requires a distance of 15 feet and good illumination to make the test trustworthy; sufficient space to allow the card to be placed at 20 feet is preferable. The articles required are a table drawer, test cards (letters and illiterate card), proper stationery, and a watch for testing the sense of hearing. Wooden tongue depressors, culture tubes, and a cake of antiseptic soap are almost necessities.

The record cards and reports required for proper medical inspection are considered in connection with the keeping of records (page 45).

THE INSPECTION OF CHILDREN.

METHOD OF BRINGING DISEASES AND DEFECTS TO OFFICIAL NOTICE.

The inspector on visiting the school should immediately announce his presence. In Philadelphia the ringing of the electric signal bells three times throughout the building is the official signal. It has been found that many more cases are brought

to light by this daily reminder to each teacher. The institution of a uniform signal throughout the city has likewise proved a good measure, inasmuch as it has avoided confusion and the possibility of misunderstanding between the medical inspector and school principals.

The children come to the office, bringing their registration cards, so that permanent defects may be noted properly upon them. A dirt-protecting piece of scrap paper bears a word from the teacher noting the region affected.

INCIDENTAL EXAMINATIONS.

(Contagious Diseases and Physical Defects.)

The miscellaneous cases sent to the office by the teachers should be first examined. In large schools with a foreign population these may be quite numerous, probably averaging 20 to a visit. Such a mass of idle, restless children requires systematic handling to economize time and avoid confusion. This is accomplished by having the children stand in line and come forward to the inspector seated at his desk. The more difficult cases encountered are temporarily stood aside until disposition has been made of the others.

These miscellaneous cases present to the examiner the greatest variety of physical defect, contagious disease, and non-contagious illness.

The co-operation of the teacher more than doubles the efficiency of medical inspection in this particular field. Some teachers appear oblivious to anything short of an epileptic convulsion or an amputated leg, while others, who teach children rather than subjects, detect many defects as soon as opportunity is given them. The writer remembers particularly a teacher in the Sartain School and another in the Allison School who detected and sent down to the inspector practically all of their eye-strain and adenoid cases before the systematic examination of their classes was made.

Similarly, the principal of the school, through his opportunity to stimulate interest on the part of his teachers, is an important factor.

Looking back over an experience covering medical inspection in 45 schools at different times, the writer remembers the most remarkable differences in the response of the principals and teachers. There is a certain principal, of good scholastic ability, but pretty well down in a rut, who invariably greeted the inspector with, "Good morning, Doctor; nothing doing today." His school contained probably 700 children and only 3 or 4 were sent down in the course of each week. Another principal, really efficient, but extremely irritable, delighted in telling the writer that the music instructor, the attendance officer, the janitor, and the medical inspector himself constituted the four major nuisances of her life. The last two days of the month, during which the monthly report was being made out, were reigns of terror for the unfortunate four.

The worst case, and rather a humorous one, was an arrangement between a principal and an inspector (not the writer) whereby the principal placed a small American flag in her office window as a sign to the inspector when he should come in. Needless to say, the results of this Paul Revere system did not amount to much.

On the other hand, a medical inspector of experience looks back upon numerous cases of hearty co-operation on the part of principals and teachers. At the Morris School the principal kept a duplicate card record of defective children for his own information. At the Kane School the principal used to send an "inspector's book" through the school by a messenger each morning at 9.30, in which the teachers stated whether or not they had cases for the medical inspector. In the lower section of the city, with a foreign population, the principals, without exception, seconded the inspector's endeavors to clear up all evident defects without delay. The principal of the Nebinger School obliged the writer by having 500 copies of the following notice mimeographed for the purpose of distribution to every teacher in the nine schools in the district:—

Teachers are particularly requested to note and send to the medical inspector all cases of poor eyesight (including internal squint or "crossed eye"), nasal obstruction, and defective hearing.

The following are the principal physical defects of school children: 1. Eye-strain. 2. Nose and throat obstruction. 3.

Deafness; discharging ears. 4. Deformities (stoop shoulders, flat chest, spinal curvature, etc.). 5. Decayed teeth. 6. Poor nutrition. 7. Nervous disorders. 8. Mental defect.

It may be remarked that this little reminder elicited such a hearty response from the teachers and such great numbers of children were sent down for examination as a result of it that it became necessary to distribute the leaflets in only one school per week.

One teacher upon receiving the notice sent down the following memorandum with the boys:—

1. (Eye-strain): Smallen and Silver. Cannot see board, and will not wear glasses.
2. (Discharging ears): Speigle. Treated in hospital.
3. (Deformities): Cizzie, Saley, Ball, Fiole, Fineberg, L. Speigle, Smith, Silver.
4. (Decayed teeth): Cizzie, Lacey, Troffican, Lambert, Rossi, Fleisher, Smith, Lucet, Graefenstein, Ragnelli, Silver, Nachtel, Fiora, Hagenbein, Rosenbaum, Fineberg, L. Fineberg, J. Schuffinan, Ball, Hignola, Coppolino, Napadensky, Dean.
5. (Poor nutrition): J. Fineberg.
6. (Nervous disorders): Anastasia.

It is possible to greatly improve the work of medical inspection by such active co-operation on the part of the teacher that the eyesight and hearing of every child is examined by the latter. At the Wharton School, whose overcrowded condition necessitated the employment of several half-time teachers, the principal utilized the extra hours' service of two of them for the testing of the children's eyesight, with the result that 400 or 500 children were quickly examined. By this means the worst cases were at once brought to the attention of the medical inspector. This matter of examinations by the teachers is again considered (page 66).

EXCLUSION BECAUSE OF CONTAGIOUS DISEASE.

The contagious disease cases encountered may be minor skin affections, such as impetigo, ringworm, and pediculosis, or the serious sore throats, such as tonsillitis and diphtheria, or the general infections, such as scarlet fever, measles, and chicken-pox. It may be safely said that a sore throat or a rash, or both, are always sufficient cause for exclusion from school. Suspicious cases of chicken-pox require examination of the chest and back. As these occur always in very small children, there is no ob-

jection to this. Suspicious sore throats should have cultures taken. If more than one case of diphtheria occurs in a class, cultures should be taken of the entire class. This procedure has given remarkable revelations of latent diphtheria in many instances (see Diphtheria). A case of scarlet fever discovered in

Fig. 5.—Taking throat cultures.

a child of 10 years or over is usually due to transmission by close contact, and an examination of the others in the class should be made for desquamation of the hands, particularly of those absent from school at a time ten to twenty days before this case has occurred.

Mild affections of the contagious kind occasionally lead to disputes with parents as to the nature of the disease. This is

particularly true of mumps and of German measles, which cause the exclusion of their victims from school. The general rule, however, that the child belongs to the parent, but the school belongs to the medical inspector, decides the question at once—not always to the parents' satisfaction.

Acute non-contagious illness is usually found to be caused by disordered stomach, a nervous attack, sickness from eye-strain, earache, or toothache. As a rule, the absence of sore throat and skin rash constitutes the most important evidence that the illness is non-contagious in character, and these two points should always be inquired into. Of course, an acute illness exhibiting headache, chills, and fever may signify a beginning infection, such as grippe or typhoid fever.

The general rule in the disposition of these cases is to carefully search for the cause, to refrain from the responsibility of a positive diagnosis unless it is an absolutely certain one, to accept the child's word that he is sick, send him home at once, and advise that the family physician be called.

Cases with serious possibilities, such as wounds contaminated with street dirt, earaches accompanied by symptoms suggestive of mastoid disease, and abdominal pain in the region of the appendix, should, of course, call forth special warnings to parents. The medical inspector should never undertake the treatment of these cases, as he thereby incurs their responsibility without possessing either future control over them, the parents' consent or facilities for accurate diagnosis.

The writer has had the experience of finding a case of acute appendicitis, a case of acute mastoiditis, a case of gonorrheal conjunctivitis, and two or three fractured bones among the children sent to him by teachers who could see something wrong, but did not know the nature of the trouble.

Causes and Periods of Exclusion.

School children suffering from contagious disease, those in intimate family contact with them, and any others who for sound reasons may be regarded as carriers of contagion, should be excluded from school. Since the process of education demands the assembling of susceptible children in large numbers,

the protective measures devised must be systematic and thorough. On the other hand, the loss of education to numerous children incidental to very drastic exclusion measures compels the practical modification of the latter to such an extent that the protection from disease during school hours about averages that experienced in everyday life. The slight risk remaining is unavoidable.

Cause for exclusion from school may be:—

1. Diphtheria, scarlet fever, tonsillitis, acute sore throat, measles, German measles, chicken-pox, mumps, and whooping-cough.
2. Pediculosis, ringworm, favus, impetigo contagiosa, and scabies.
3. Non-vaccination.

1. The first group includes those diseases coming under the jurisdiction of the local boards of health and therefore subject to their regulations. The following table, which presents modified rules of the Medical Inspection Division of the Philadelphia Bureau of Health, embodies the writer's ideas as to the precautions necessary in each case:—

2. The second group includes all the well-known contagious skin diseases, mostly parasitic in character. They are of minor importance individually, except ringworm of the scalp. In each case only the child afflicted is excluded from school. Return to school is permitted immediately after recovery, and in those cases in which antiseptic local treatments are assured by the presence of a school nurse the child need be excluded only for one or two days while the disease is brought under control. Exceptions to this are scabies and favus, which may require a week or two to improve, and ringworm of the scalp, which, under the most careful treatment, may require many weeks' time to heal sufficiently to become harmless to neighboring children.

Due notice of all exclusions for contagious diseases should be received by both the school principal and the parents. In the case of the contagious fevers, which, by requirement of law, are handled by the health authorities, the latter, as a rule, issue postal cards to school principals, notifying them of such exclu-

TABLE OF DISEASES AND PERIOD OF EXCLUSION.

EXCLUSION			DURATION OF EXCLUSION PERIOD		
Disease	*Patient*	*Other children in the same house, unless living in entirely separate apartments*	*Patient*	*Others excluded who continue living in the same house*	*Others excluded who remove from the house*
Diphtheria	Yes	Yes	After disinfection. Until recovery. At least 3 weeks	After disinfection. Until recovery of patient. At least 1 week	After disinfection of clothing. One week
Scarlet fever	Yes	Yes	After disinfection. Until recovery. At least 6 weeks	After disinfection. Until recovery of patient. At least 2 weeks	After disinfection of clothing. One week
Tonsillitis	Yes	No	Recovery. One week		
Acute sore throat	Yes	No	Recovery		
Measles	Yes	Yes, in country schools. In city schools exclude those under 11 years of age	At least 2 weeks	If excluded, until recovery of patient. At least 2 weeks	Three days
German measles	Yes	Yes	Ten days	Ten days	Three days
Chicken-pox	Yes	Yes	Eighteen days. Until scabs are fallen off	Eighteen days	Three days
Whooping-cough	Yes	No	After recovery		
Mumps	Yes	Yes	Fourteen days	Fourteen days	At once

NOTE.—All the conditions given in each space must be complied with. Bacterial cultures should be taken, if possible, from diphtheritic throats.

sions. The Philadelphia card, which is copied on the New York model, is given on the next page (Fig. 6).

School principals and parents of the sick children are also notified by the health authorities of the date when return to

DEPARTMENT OF PUBLIC HEALTH AND CHARITIES
Bureau of Health—Room 712 City Hall

Philadelphia ______________________ *190*

To the Principal of ______________________ *School*

Exclude From School *all persons residing with the family of* ____________

____

No. ______________________ *Street, who is suffering with* ______________, *until a Medical Inspector certifies that the period of exclusion has ended.*

The following persons attend your school ______________________

____

By order of the Board of Health.

A. A. CAIRNS, M. D.
Chief Medical Inspector.

Per ______________________,
Medical Inspector.

Fig. 6.

school is permitted. In the case of diphtheria and scarlet fever this date may be anywhere after the minimum period of exclusion for these diseases, and depends on the time required for convalescence of the patient and the date of house disinfection. In the case of the minor diseases a definite period for exclu-

DEPARTMENT OF PUBLIC HEALTH AND CHARITIES
Bureau of Health—Room 712 City Hall

Philadelphia ______________________ *190*

To the Principal of

______________________ *School*

The period of exclusion from School of all persons residing with the family of ______________________ *No.* ______________ *Street, who has been suffering from* ______________ *having expired, said persons are permitted to return to school on* ______________

By order of the Board of Health.

A. A. CAIRNS, M. D.,
Chief Medical Inspector.

Per ______________________
Medical Inspector

Fig. 7.

sion for each allows of immediate statement as to the date of return. The Philadelphia cards are presented in this connection (Figs. 7 and 8).

Notification of teachers and parents in the case of children suffering from ringworm, pediculosis, etc., may be made upon

BUREAU OF HEALTH
CITY HALL

Philadelphia, ... *190*

Sir:

You are hereby notified that notice has been sent to .... *School, permitting the return of your child on* ....

A. A. CAIRNS, M.D.
Chief Medical Inspector.

Fig. 8.

printed cards. The New York card used in the notification of parents is here presented (Fig. 9).

MEDICAL INSPECTION OF SCHOOL CHILDREN
NOTICE TO PARENTS

.... 19....

Name .... Age ....

Address ....

is ordered to discontinue attendance at

.... School

Reason ....

The disease mentioned is a contagious affection and liable to be transmitted to other children. The child should receive prompt medical treatment and should return to school .... 19.... If found free from contagion at this time he may resume attendance at school

Medical Inspection of School Children.

Fig. 9.

The teacher should be notified by means of the card used both for contagious disease and physical defect:—

Name ....
Date ....
Disease or defect ....
Action ....
.... Inspector

By this means the teacher is properly cognizant of the status of the case, and the chance of the child's slipping into school undetected, or staying out indefinitely by reason of misunderstanding, is removed.

3. Exclusion for non-vaccination is compulsory by act of legislature in many States and rightly so. In our large cities the law is rigidly enforced in the public schools, furnishing a demonstration that the attainment of universal vaccination simply depends on the energy of the authorities. Unfortunately, in our private and country schools there seem to be no school or health officials actively interested in the matter. The epidemics of small-pox in rural districts reveal a sad neglect of vaccination, and, while, so far as I know, no harm has yet resulted, the parochial schools in Philadelphia, at least, are very careless in enforcing the law. In this respect the public schools were just as negligent before the advent of the school physicians. In the year 1905, shortly after the school inspectors began their work, the chief inspector, Dr. Cairns, collected nine thousand vaccination certificates shown to be untrue by the examination of the school children's arms.

It is the custom in Philadelphia to offer free vaccination by the medical inspector. This is done, of course, only after a primary official request to be vaccinated has been ignored or refused. By this means much dispute is avoided. The statement from the parents that several unsuccessful attempts have been made to vaccinate should not influence the medical inspector in the least. These unsuccessful attempts have usually been made with virus which has become worthless through age and storing in a warm place. Fresh virus from the ice-box will practically never fail on an unvaccinated child.

The attitude of parents of unvaccinated children toward the medical inspector depends entirely upon his own promptness of action. It is only those cases allowed to stay in school for days and weeks that produce parents' indisposition to obey the law, these parents judging that a law so loosely enforced may possibly be evaded.

Disinfection.

School buildings should be disinfected both as a routine and an emergency measure. Formaldehyde is the best agent and is efficiently employed by sprinkling the watery solution upon the floor with a resulting evaporation and diffusion of the gas. The room or building disinfected should be closed tight for twenty-four hours in order to insure the destruction of all germ life. As a rule, the entire building is treated, rather than one class room, in order that the hall and dressing closet may be included, and because of the inability of the loose sash partitions to confine the pungent gas to any one room.

The use of heating devices and of the solid substance paraldehyde is an unnecessary expense.

It is the custom at the present time to call upon the health authorities for the disinfection of schools, but this is not at all necessary. The janitor, and in small country schools the teacher, can readily do the work if supplied with the material. In Philadelphia, prior to the days of medical inspection, the principal of the Robert Morris Grammar School disinfected his class rooms as occasion required, with material donated to him on request by the Bureau of Health.

Disinfection as a routine measure is not practised anywhere at the present time so far as is known to the writer. It might with propriety be done monthly, thus insuring the purification of dusty places inaccessible to the janitor's broom. Its only drawback, if done on a Saturday, is the expense, which is slight, the inconvenience to the janitor, and the necessity of removing aquaria and plants from the building.

Disinfection as an emergency measure may be done because of the occurrence of diphtheria, scarlet fever, or one of the lesser contagious diseases in a pupil or one of his family. Since disinfection entails the dismissal of the school, it is necessary to restrict its exercise to the worst cases. There are many instances in which one is compelled to take a slight extra risk of contagion. A large city school would be closed twenty or thirty days in the year if disinfection were practised upon the occurrence of every case of disease.

There is no doubt that the efficiency of disinfection *alone* as a preventive measure is greatly overestimated. The principal source of disease is directly from one child to another, and the children themselves should be the chief object of attention. The purification of a room is useless if it is destined to be occupied the next day by six pupils with chicken-pox who have gone home undetected, or by a like number of children with diphtheria bacilli in their throats, or by a child convalescent from scarlet fever and shedding desquamated skin upon his neighbors. There is something impressive about fumigation to the popular mind, and a vague belief appears to exist in the minds of teachers that "to disinfect or not to disinfect" is equivalent to determining definitely the protection of the scholars.

It cannot be stated too strongly that the thorough sweeping and airing of a building, aided by sunlight, makes a fair substitute for disinfection, and that the first precautions taken should be to examine the bodies of all the children in the class in case of chicken-pox; to examine the hands of all children for desquamation, but especially of those absent from school at a period three weeks previously, if the disease be scarlet fever; to take cultures from the throat of all children in a class in which diphtheria has occurred, and to detect any sneezing, coughing children when measles has broken out.

The once common practice of daily distributing and collecting pencils for class work should be absolutely forbidden. Such pencils are usually put into the mouths of the children, and are therefore the most fruitful source of contagion that could well be devised.

As a working rule, disinfection should be done if a scarlet fever or diphtheria patient attends school after the outset of the disease, or if several brothers or sisters attend school until excluded by official cognizance and action two or three days after the onset. Epidemics of measles and chicken-pox very seldom occur among older children, who are immune by reason of previous attacks in early childhood. For this reason sporadic cases in children over 10 years of age may be ignored. On the other hand, in the lowest grades it is almost impossible to check the spread of these diseases, and disinfection is only of service if

accompanied by the close personal examinations and observations already mentioned.

SYSTEMATIC EXAMINATION OF CHILDREN.

Preliminary Arrangements.—After disposing of the cases sent to him by the teachers, the inspector should proceed with the systematic examination of the whole number of children. If several schools are visited, the one in which this work is being done should be placed last on the list.

A good plan of procedure in examining 20 or 30 children is to instruct the teacher to send 4 children to the hallway just outside the open door of the examiner's office, and, as the examined children return, to keep sending others singly to replace them. By this favorable arrangement the examiner is not kept waiting for children, and the small number prevents their becoming restless and disorderly. The children in the doorway can observe the general scope of the examination and thus, by gaining a comprehension of the examiner's methods, can expedite their own examination. Care should be taken that they are not in a position to see the letters on the vision-testing card, and so memorize them before examination. Such a fault is shown in the accompanying illustration of the testing of the eye. Each child should bring his "individual card" (see page 48) to the inspector, who states on it the result of the physical examination and from it makes up his "records of defective children" and his notices to parents.

Scope of Examination.—The physical examination of the school child should be of such scope as to cover the basic defects found in the following fundamental groups:—

(*a*) Eye-strain.
(*b*) Diseases of the nose and throat.
(*c*) Defective hearing.
(*d*) Decayed teeth.
(*e*) Poor nutrition.
(*f*) Nervous disorder.
(*g*) Orthopedic defects.
(*h*) Skin diseases.

The things which should *not* be included in a medical examination are well worth enumerating, since thousands of

dollars in salaries have been wasted in useless effort. They may be classed under three heads: (*a*) Work which is scientific, but of no practical value; (*b*) work which is scientific, but impractical of accomplishment; (*c*) work which is neither scientific nor practical.

Included in (*a*) is the measurement and weighing of children. The advocates of this procedure are always men without experience in medical inspection, who fail to keep in mind that it aims at the correction of defects, not at the creation of anthropological records. Abundant figures on the average height and weight of children of all ages and nationalities already exist, and there is not the slightest chance of medical inspectors' measurements, which are taken necessarily with shoes and clothes on, ever being collected for publication. A further argument against these records is that children are systematically examined at such irregular intervals that the factor of growth-per-year will not be ascertained. Another adverse point is that one or two records only have no value whatever, since the child is constantly growing. Finally, every physician knows that figures alone convey little concerning the nutrition of an individual. Given a patient with consumption, or other wasting disease, the weight of that patient, in connection with general knowledge of him, is very important and should be systematically ascertained; but the bare statement that Willie Smith, date of birth 3-17-98, weighs 85 pounds and is 56 inches tall fails to stir up any conception whatever of Willie Smith and will never be read twice by any one.

Included in (*b*) are the suggestions which have been made to refract the eyes of all children by the use of atropine, examine their noses and throats with the aid of a mirror, apply the von Pirquet vaccination test for tuberculosis, and undress the children in search of lateral curvature, diseases and defects of the skin, and general uncleanliness. The examination of the heart, which is really very desirable, cannot, unfortunately, be made through a stiff shirt or a corset, and so, as a routine procedure, also falls into this category. In America, at least, public sentiment forbids the assumption of such paternal functions.

Included in (*c*) (things neither scientific nor practical) is an inquiry into the nationality of mother and grandparents, an inquiry into the medical history of the child, and systematic note of the complexion of children. Whether a child is a blond, brunette or mulatto does not materially affect his general

Fig. 10.—Testing the eyesight.

health, and is not a matter of sufficient importance to warrant the employment of a medical inspector.

The inspector's efficiency as an examiner depends principally upon his medical skill, and, to a less degree, upon his ability to handle children. Concerning the former, the medical inspection corps of a large city shows such remarkable variation that it may truly be said that the good inspectors are each worth three poor ones. The skillful physician is accurate in his methods and judges well the importance of the defects and

symptoms encountered. Beginning the work well equipped, and limited in the extent of his explorations of the body, he cultivates his power of observation to a high degree after the manner of our leading physicians thirty years ago, before chemical analysis and bacteriological examinations were known. On the other hand, the unskillful inspector is either slovenly in his methods or obtuse to the significance of his findings.

Fig. 11.—Testing for nasal obstruction.

Method of Procedure.—The following plan of routine procedure in the systematic examination of children will be found very satisfactory:—

The child approaches the examiner, who is standing at a stated distance—say 20 feet—from the eye-testing card. He is then asked to read the test letters and gently turned toward the card if non-comprehending. The eyes are tested singly, the other eye in each case being covered with a stiff card. A paper, if used, allows the child to press his hand into the eyeball and

unfit it for further test for one or two minutes. An inquiry is made as to headaches and fatigue of the eyes after reading. The child then faces the inspector, who examines the throat and teeth, also the general appearance of the eyes and complexion. Nasal respiration is next tested by having the child breathe through each nostril separately and, if obstruction exists, by as good an inspection of the nasal passage as may be made. In this connection the examiner will do well to explain to the child what is meant by nasal respiration by demonstrating it himself. It is a good plan to say, "Shut your mouth, as I do. Now breathe in and out through your nose, this way," and then, as the child is breathing through his nose, reach forward and gently close each nostril separately with the finger. Finally, the child is turned to face away from the inspector, although still standing before the latter, and his hearing tested with the watch, held first to one and then to the other side. This position also affords an opportunity to detect uncleanliness of the head. The speech, nutrition, nervous condition, and general physique are noted by general observation, unless suspicious symptoms be present, in which case further and particular tests are made. The existence of suppurative discharge from the ear, as well as important information as to the history of the case, should always be ascertained.[1]

A few other useful points may be mentioned. If glasses are worn, the vision should be estimated with their help, as the case does not interest the medical inspector if the defect is already corrected. Of course, defective vision with the aid of glasses implies necessarily no reproach to the oculist who prescribed them, as full vision is not always attainable or may not be desirable in that particular case; or possibly is not attainable because due to some other cause than an error of refraction, as, for example, some disease of the retina.

[1] As to official cognizance of these suppurative cases, those with copious and offensive discharge should be promptly excluded from school while in that condition, since simple cleanliness by daily syringing will reduce the trouble so that it is apparently almost cured, and therefore ceases to be a nuisance. Beyond this, nothing can be done under present conditions, except to persistently urge proper treatment. No parent who neglects his child has a right to send that child to school to sicken its playmates and contaminate with pus everything it touches.

Again, it is hardly fair for parents of moderate circumstances to be urged to the expense of consulting a specialist without justification for doing so. Therefore it is well to note the date at which these glasses were prescribed, and the agency whence they came. Glasses ordered one year previously by a reputable oculist probably cannot be improved on, while glasses ordered three years ago by an advertising optician which do not relieve or correct defective conditions almost surely are faulty.

When large numbers of children are examined and time is a factor, the examiner naturally devises a system adapted to his circumstances. It is a good plan (assuming the child is seated at 20 feet distance) to make a heavy wedge or arrow mark in blue on the card, at either end of the line of letters to be read at 20 feet. Then similar markings in some other color, such as red, at either end of the line of letters above it (to be read at 25 feet or 30 feet as the card may be constructed). By starting the child at the "30 feet" line and using the larger letters only where vision proves defective, the average time consumed is reduced one-half. Started at this line instead of directly on the type to be read at 20 feet, the child finds the place more readily, acquires confidence by successfully reading these letters, and demonstrates to the examiner that he understands what is wanted. If a failure to read the "20 feet" type follows the successful reading of the "30 feet" type, the examiner has no doubt that the child knows what he is supposed to do and is endeavoring to do it.

This marking of the test card also allows the examiner to remain seated at a table where he can make the record and at the same time command a view of both the child and the card. Any one who has examined for two hours, alternately standing beside a test card with a pointer and going to a table or desk to make the record, using constantly the eyes, voice, and body, with the added effort of instructing each child clearly what to do and how to do it, will testify to the absolute fatigue experienced, as well as the feelings of eye-strain ensuing. This little device is, therefore, regarded as particularly valuable.

The examiner need not be surprised to find eye-strain associated with the most varied conditions, often in one person.

There is usually something about the appearance of the average child suffering from eye or nose and throat defects that betrays him at once to the experienced medical inspector. This is, however, not always the case. Often a child has good vision in one eye and very poor vision in the other. He discards the poor eye unconsciously in viewing distant objects, and consequently has no symptoms whatever. These children are sometimes unaware of their own condition until it is revealed to them at the time of examination, by the failure of the defective eye to read without the other.

The astigmatic chart and the test type for near vision are used in making a more exact diagnosis, and, while they are not necessary for routine medical inspection, the medical inspector, as a physician, should be familiar with them to help him in his work. There is no reason why the teacher should not understand their use also, as they are simple enough to any educated person. Certainly, when one considers the trials and obstacles in the path of the medical inspector, it is apparent that the more accurate, scientific, and positive his diagnosis is, the better he prepares himself for subsequently maintaining his position in case of controversy, and obtaining results.

The number of children examined each day by the inspector should average about 20, and the assignment to one man of so many schools that these systematic examinations are impossible is a serious mistake.

Conversely, the suggestion has been made that an economy would be effected if the inspector should occasionally or regularly work an entire day in one school, and thereby accomplish a large number of systematic examinations. Such a plan would be entirely impracticable. Aside from the ill health resulting from inhaling the expired air of 60 or 70 children, the fatigue attendant on examining their eyes would make it prohibitive. An hour and a half of eye testing is almost sufficient to start up a headache in any examiner, no matter how perfect his eyesight, and phlegmatic his temperament.

When medical inspection was instituted the systematic examination of children was made simply by having the children pass in review before the examiner. By quick scrutiny the latter detected skin disease and pediculosis cases particularly,

and occasionally some evident case of poor eyesight or adenoid obstruction. This rough method, of course, detected only the most flagrant cases of defect, but the suggestion has recently been made that a quick review of all the children in the school by the inspector in the month of September sorts out the worst cases, and at least prevents the rather disreputable condition in which numerous gross and evident defects exist in a school for months before correction. The examination of each child should consume from two to seven minutes, depending upon its thoroughness, the skill and rapidity of the medical inspector, and the clerical work entailed.

Vaccination Marks. Examination and Certification.—In those communities living under a compulsory vaccination law or a law requiring successful vaccination as a qualification for school attendance, the vaccination marks are to be examined at the entrance of the children into the schools and unvaccinated children who have not had small-pox excluded. Free vaccination should be offered to all. The family physician's certificate giving illness as an excuse for non-vaccination should be renewed every three months. A strict observance of these rules practically does away with parental protest.

In certain States the rules provide that the regular grade teachers shall test the eyesight and hearing of all school children once every year, and that those cases found defective shall be referred to the medical inspector. It is unnecessary to say that such a system is far from perfect, and many cases escape detection by reason of lack of medical knowledge in the examiner. This is particularly true of eye-strain cases in which good vision is maintained by effort. However, it accomplishes noteworthy results, and not only detects all the worst cases, but acts as a means of interesting the teacher in the health of the children and of making her more keen to observe their physical condition.

There is no doubt that the most efficient medical inspection is obtained by means of the physical examination of every child by the inspector, with an annual inspection of the sight and hearing of every child by the teachers. In this way the inspector ultimately gives every child the benefit of a thorough examination, but children suffering from gross defects do not

have to wait a year or two to be seen by the inspector. One thing is certain, however, teachers may be expected to co-operate only if they are allowed to do this work in the regular school hours without extra effort. A simple and proper method would be to dismiss the class ten minutes before the regular closing time, during the month of September, until the children (3 each day) are all examined.

KEEPING OF RECORDS.

The education of the public as to the nature and prevalence of children's diseases, the appreciation of the whole system of medical inspection by the public authorities, and its conduct on sound business principles, all require that proper records be kept.

The reports on the physical condition of school children which have been issued in the past by school and health authorities have been fair statements of conditions found, and have served to demonstrate the wisdom of medical inspection and to further its universal adoption. It must be admitted, however, that up to the present time they have not, as a rule, been compiled in the most scientific manner. Curable and non-curable, primary and secondary, temporary and permanent, mild and severe defects have been lumped together to form totals which have further been swelled by the addition of mere symptoms, such as headache, earache, and toothache. No intelligent conception has been given of the relation between the number of defective children, the number of defects found, and the number of children receiving parents' notices. As a consequence, enormous figures may be quoted, which are impressive enough, but which fail to add to our medical knowledge. As a matter of fact, they have on occasion actually done harm by reason of their employment as a basis for deductions as to the degeneracy of the race, the relation of physical to mental defect, etc. Thus it is not uncommon to see such press notices as, "of 250 children examined in the schools of ———, 8 per cent. were found to be physically defective;" "of 50 children examined at ———, 40 possessed decayed teeth;" "Dr. ——— finds by a statistical study that there is no relation between physical and mental defect." Such

reports fail to state that the first investigator had zealously included every minute imperfection, and had multiplied one eye-strain case into the four defects of "defective vision," "headache," "blepharitis," and "stye"; that the second had examined a class of eight-year-old children, whose age bespoke a large number of decaying temporary teeth; while a third had drawn his inferences after ruining the value of his work by including decayed teeth and the enlarged cervical glands secondary thereto among the physical defects considered.

Before beginning the consideration of the best record forms to be kept, it is well to note the relation of *records* to the other parts of school inspection. They should be as simple as scientific work and good business administration will allow. The school inspector not only writes records, but journeys to and fro, examines children, and takes measures to obtain the correction of defects and the exclusion of children suffering from contagious diseases. For this reason, the *time element* must be considered in formulating a proper system of recordkeeping, since it is obvious that records, while they should be practical and scientific, must not consume too much time, or the inspector will do very little inspecting.

There may be a danger in small communities that the single medical inspector employed by the authorities will become a law to himself and consequently become careless in the keeping of proper records.

In our large cities, however, there is a tendency toward too much bookkeeping by the school physician, and it is not unusual for one-half or two-thirds of the medical examiner's time to be consumed in the writing of multiple reports and complex records. Many of these are futilely devised to take the place of personal supervision, which, as has been noted, is essential in the conduct of medical inspection on a large scale. Their aim is not to record useful facts, but to check up the inspector's work and personal honesty. Failing to do this, because it is just as easy to record a false entry four times as it is to record it once, hundreds of dollars' worth of stationery and thousands of dollars' worth of salaries are wasted. We do not say, also, thousands of dollars' worth of clerk's time for file-indexing, because these costly papers are either filed helterskelter into a cabinet to produce an appear-

ance of bookkeeping or else are thrown carelessly into the cellar. It may be noted that the Philadelphia system, which is probably no exception in this respect, in the year 1909 required a seven-time memorandum of every defect encountered, if the notice to parents and the inspector's private record be included. This aggregates a quarter of a million entries annually on account of defects and disease, in addition to the complete physical records of the children classed as normal.

Another waste in recordkeeping arises from the devising of medical inspection systems by non-medical persons who have nothing but a superficial book knowledge of the same. It should be evident to any one that a man who has never seen a child examined, who knows nothing about the practical procedures necessary to get a child from the class room to the office, or to secure the correction of defects, should not launch a system on a wholesale scale without consulting the men who are actually doing the work. Yet the writer has seen cards suggested and even printed, the use of which in a city of half a million people would entail a relative waste of $10,000 or $15,000 a year. The principal difficulty experienced by theorists to whom a case of scarlet fever, a scratch, and a decayed tooth are all similar items is to obtain the proper sense of proportion. With the use of such a system I have known medical inspectors to deliberately fail to report anything concerning the more trivial cases on the ground that the matter was of no permanent importance and the record at the central office was not worth the six or seven entries necessary to balance the account.

That the work of medical inspection has so far suffered from the lack of a standard system of recordkeeping has been commented upon by various writers interested in the subject. Dr. Leonard P. Ayres, writing in *School Hygiene,* December, 1908, remarks:—

"The man who will come forward with a simple, rational, and practicable system of statistics for medical inspection will confer on the movement a boon of so great importance that he will merit the lasting gratitude of all who are interested in the work. At present definite information in quantitative terms is meager in quantity and dubious as to quality. To cite a very simple instance: It is almost impossible to get any reliable statistics as to the cases of contagious disease found in different localities. Diligent examination of all the printed reports

obtainable from cities having systems of medical inspection yields very poor results. In most cases the doctor's report shows how many cases of contagious disease were found, but not how many children were examined in finding the cases. Again, when the number of children examined is stated, it is almost always found on examination that the number given represents not the number of *children* examined, but the number of *examinations* of children.

"Again, passing from a consideration of examinations for the detection of contagious diseases to examinations for the discovery of physical defects, an even greater paucity of available information is discovered."

Discussing the impressive effect of the huge totals set forth in the annual reports of the medical inspection of our great cities, Mr. Ayres further remarks: "An analysis of these large figures serves to raise grave doubts as to their accuracy and significance." Thus, in analyzing the work of the medical inspectors of one large city, he says: "It is worthy of note that, during the year 1904, each medical inspector (according to the figures just quoted) must have visited nearly two schools per hour every day in the year, and that during every day in the year every inspector employed examined over 200 children every hour."

Again Mr. Ayres remarks, after analyzing the work of the school nurse as stated in an official report: "This means that they all worked at the stated rate of two examinations per minute; inspection for pediculosis and trachoma every three minutes, and a treatment for miscellaneous ailments every fifteen minutes. During their spare time they also gave 4959 treatments in the districts for scarlet fever, measles, and diphtheria, and made 910 miscellaneous visits."

Taking up now in detail the essential records, we have:—

1. The child's individual record of his physical condition.

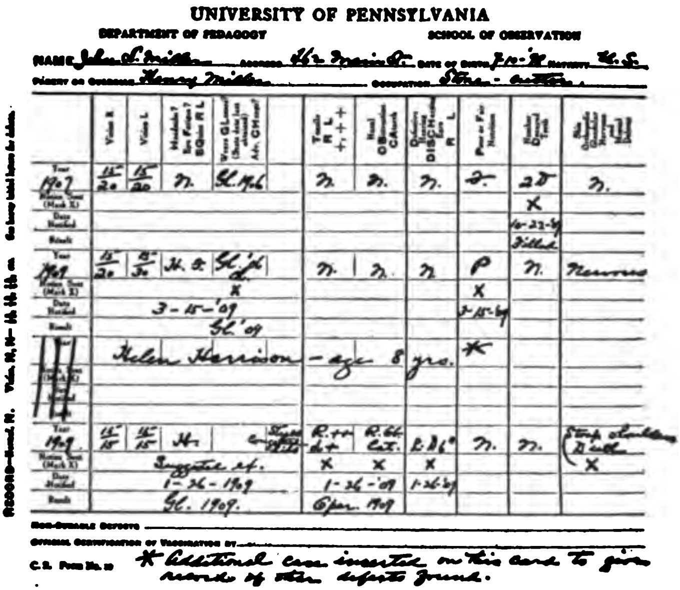
2. A record of the defective children and their defects.

3. A summary of the defects found, diseases encountered, and the results obtained.

These three forms, it will be seen, correspond to the three essential ones in bookkeeping, namely: the Ledger, the Journal, and the Statement. To the three already mentioned we may add the record forms used by the school nurse, since the latter has become essential to successful medical inspection.

The Child's Individual Record Card.—The card for each child containing his physical record is kept on file at the school. Its best place of deposit is with the class teacher rather than the principal of the school, since a progressive teacher will study the physical condition of her children as a part of her work.

A duplicate set of individual records in the principal's office, however, is a valuable thing, as the supervising principal theoretically knows all about the children under his or her care, and is especially conversant with the social and medical condition of the children who fail of promotion. A suggestion has been put forth by some one that these cards should be kept in the central office, but such a procedure would be to rob them of all their practical value. They are essentially a memorandum for the medical inspector, the teacher, and the parent.


UNIVERSITY OF PENNSYLVANIA

DEPARTMENT OF PEDAGOGY — SCHOOL OF OBSERVATION

3-15-'09

Helen Harrison — age 8 yrs.

1-26-1909

* Additional case inserted on this card to give records of other defects found.

Fig. 12.—Physical record card.

The individual record card should follow the child from class to class throughout his school life.

As to the make-up of the record card, let it be noted that the records and the reports of the physical condition of school children which have been issued in the past by school and health authorities have not evidenced a comprehensive understanding of the various diseases and defects encountered. If we glance over the various records used by different American cities, it will be seen that the majority of them are modeled

upon either those of New York City or the form issued by the State of Massachusetts, showing that the majority of communities taking up medical inspection have created their stationery by the simple process of copying from these two models. Without criticising either of them, it is obvious that this does not mean much of an advance toward a permanent and perfect record card.

Let us make our physical examinations and compile our statistics in conformity with the following principles:—

1. The principal defects should be clearly recorded and emphasized. Those most frequently met with are eleven in number: eye-strain, enlarged tonsils, nasal obstruction, defective hearing, discharging ears, poor nutrition, decayed teeth, stoop shoulders (including flat chest), lateral curvature, nervous exhaustion, and mental deficiency.

On the other hand, infrequent physical defects do not require separate spaces nor categorical mention. A space marked "miscellaneous" provides for these.

2. The defects listed upon the card should be placed in logical groups.[1]

3. Non-curable defects, such as weak heart, high palate, and paralyzed limbs; and temporary ailments, such as styes, boils, and infrequent headaches, should receive separate record.

4. Secondary symptoms, such as headache and catarrh, should not only be recorded in such a manner that their secondary character is understood, but should be grouped so that medical knowledge as to their relative frequency may be acquired.

5. The number of physical defects reported to the parents for treatment should be stated separately from the number of defects noted of minor degree or character.

6. There should be a record of the notification of parents if such notification is made, together with the date and official information as to the correction of the defect.

---

[1] A card recently seen places anemia and pediculosis side by side and has, as four separate entries, "nasal catarrh and adenoids," "nasal obstruction," "nasal catarrh," and lastly "postnasal catarrh." "Carious teeth" and "oral sepsis" are both mentioned, although sepsis in its major sense means the evident infection of the whole system and in its minor sense is an accompaniment of every decayed tooth.

7. The individual eye records should state the acuity of vision, the existence of squint, and the wearing of eye-glasses.

8. Provision should be made for recording separately the hearing of each ear.

9. The spaces on the card should be large enough to permit the writing of at least one word. Minute spaces allowing only checking marks do not always give intelligible information.

10. Allowance should be made for at least four examinations, since the school life of the average child is eight years. Provision for more than eight examinations (one per year) is superfluous.

11. Age, grade, and social condition should be considered in connection with physical defect. By this method developmental defects can be traced, year by year, throughout school life; the maximum prevalence of nasal obstruction and decayed teeth at definite ages demonstrated, and the relation of these various defects to the environment of the children determined.

12. The age of the child is best stated by giving the date of his birth.

13. The father's nationality should be stated. A record of the mother's is ordinarily superfluous, since it is usually that of the father. Some record cards provide space for records which are unnecessary or impractical.

14. Records of height and weight are of no practical value, except in those cases where they are unusual. Medical inspection is not anthropometry.

15. Records of conduct, effort, and proficiency are not germane to medical inspection.

16. Records of minor diseases contracted during the school term are of no particular value, unless they have operated to exclude the child for a long period or have a medical significance. Thus, eczema may indicate malnutrition, local eczema may indicate nasal catarrh or pediculosis, and diphtheria may indicate an unhealthy throat. On the other hand, measles, chicken-pox, cuts, and scratches are incidental to the life of the child, and have no after-effect.

17. Records of heart and lung disease cannot be made routinely, since our laws do not permit the undressing of the child.

Looking over three or four record cards at hand, I have one which presents a number of defects too rare to deserve categorical mention: defects which are non-curable; a record of the height and weight; a record of the conduct, effort, and proficiency of the child, and a record of the diseases contracted during the school term. Provision is made for two examinations every year, which is superfluous. The card has provision for 450 entries on an area of 6 x 3¼ inches; each of these spaces measures 5/16 x 5/18 of an inch. In the case of eye-strain, such a space is used to cover the whole subject, no provision being made for separate examinations of the two eyes, nor are spaces allowed for the testing of hearing of each ear separately. The back of this card makes a very fair attempt to overcome the difficulties forced upon the inspector on its face side by giving the diagnosis of the defective condition found and the treatment received. It can readily be seen, however, that, while the most prominent defects are thus very properly emphasized, the original records on which these statements are made are too scanty to be of service, so that an amplified and duplicate statement is necessary.

Another record card at hand simply provides six columns marked eye, ear, throat, nose, skin, and orthopedic, with provision for ten examinations in each column. Each of these spaces measures ½ x 3/16 of an inch. No mention is made of nutrition nor of the teeth, nor are the right and left eye and right and left ear mentioned separately, nor is any provision made for the record of the date on which the parent is notified. The nine examinations provided for are ample, since it is a matter of record that, in the six years of medical inspection which the city has enjoyed, very few children have received more than three examinations, and many have not been examined at all.

The writer also has a card at hand which is a remarkable example of the workings of a non-medical mind well trained in bookkeeping. This card entirely overlooks the fact that it should accompany the child throughout his school life, giving information to successive teachers and successive medical inspectors of the child's physical condition. It provides for one examination only, after which it is supposed to be sent to the central office and filed away among the archives. The theory is that if *a stranger* (note the probabilities) should desire at any time to know something of Johnny Smith's physical condition, he would not go to Johnny Smith nor his school, but to the central office in the City Hall, where Johnny Smith's card, which has been filed with over 100,000 others alphabetically, at the expense of much money, may be extricated and studied. Meanwhile the parent and the teacher have no record whatever, and the work of the medical inspector is buried alive. A detailed examination of the card shows the age and the grade laid out in stated terms, the age running from 1 to 18 years, all of which entries overlook the fact that it is as easy to write 8 and 3 in the appropriate spaces for the age and grade respectively as it is to find 8 and 3

in a solid block of figures. Besides the blocks of figures occupy useless space, and the years given are ridiculous. Both parents' nationalities are given, although common sense dictates that the nationality of the mother, if she be a foreigner, is the same as the father, and in such event can be learned only by sending for the woman herself. Fine distinctions are drawn between Polish, Russian and Slavonic. Finally, an examination of the list of defects set forth shows a jumble of physical defects, parasitic diseases, causes and effects. Anemia and pediculosis stand next to each other on the list; nasal catarrh and adenoids; nasal obstruction, nasal catarrh and postnasal catarrh are found. "Carious teeth" and oral sepsis are both mentioned, although sepsis in its major sense means an evident infection of the system, and its minor sense may be looked upon as an accompaniment of every carious tooth, and, finally, phlyctenular conjunctivitis, corneal ulcer, blepharitis and marginalis are mentioned, although any oculist knows that blepharitis is usually due to simple neglected eye-strain, and that corneal ulcer is simply one part of phlyctenular conjunctivitis.

Here is presented an individual card giving the essential data. It will be noted that the principal defects are listed, with a column for miscellaneous defects on the right. The administrative features (notification of parents and correction of defects) are provided for. The name and occupation of the parents, and the name, age and nativity of the child are also stated. The non-curable defects are noted, and the vaccination mark inspected. No attempt has been made to furnish long educational, social, and anthropometric information, as this is not germane to medical inspection.

Notification of Teachers.—Memorandum of the nature of the trouble, even if only a word, should be sent to the teacher. It may be done on the same scrap of paper on which the teacher notifies the inspector of her reason for sending the child to him. This is due to the teacher, and is a stimulus to interest in the work. In case of exclusion, the teacher should be notified of the date fixed for the return to school, as she is the person having the surveillance of the child.

Record of Defective Children.—A memorandum list is kept by the inspector at his desk in the school, stating the cases of physical defect and contagious diseases encountered. The record is a continuous one from day to day, and also gives the date of examination, the child's name, the number of the room in which the child may be found, and, afterward, whether or not

the defect has been corrected. If the case is one of contagious disease rather than physical defect, the record states the date of exclusion from school and the date of return. It will be seen that, from a bookkeeper's standpoint, this card is the journal, and the child's individual record card is the ledger.

It may be noted that this list is very useful at the beginning of the school year, since the medical inspector can, by its help, quickly bring before him all defective cases who have neglected to procure treatment, and stir them up with a second notification, before proceeding to the routine examination of the whole number of children.

The record of the correction of defects can easily be obtained by having the cards bearing the record of defective children looked over by the teachers at stated periods. The latter readily single out their own children by means of the names and room numbers, make inquiry of the children as to treatment, and set down the same in the space reserved for the record of the correction of the defect. The words "treated," "not treated," "promises," and "left school" are sufficient to convey this information.

The transfer of this record of the correction of defects to the child's individual card is usually a matter of some difficulty because of the necessity of getting the card out of the pack in which it is kept. If all the individual cards be kept together in the principal's office, there is the labor of extracting each record from the file of the whole school population. If the cards are kept in each class room the teacher has an excellent opportunity to note upon them whether or not the defects have been corrected, but unfortunately the general record of defective children usually reposes in the principal's office on another floor of the building. Probably a teachers' conference every month for the purpose of keeping up the health records and discussing individual children would solve this little problem and at the same time benefit the teachers by keeping up their interest.

Following is an illustration of a record of defective children:—

It is worth while to enter into a discussion of the relative merits of the list of defective children just described carried on a large sheet, and the making up of the list of defective children

on individual cards. The latter, of course, is a collection of simplified individual cards of those children who have been found defective. The city of Philadelphia uses such a system, the idea being to preserve the list of defective children at the central office in the City Hall, in alphabetical order, keeping the school

No. 7
SCHOOL Washington YEAR 1910

RECORD OF PHYSICAL DEFECTS AND DEFECTIVE CHILDREN

ROOM, GRADE OR TEACHER	NAME	DATE EXAMINED	DEFECT	RECOMMENDATION	*RESULT
15	Mary Cody	4/7	eyes (½)	M. D.	not treated
15	Helen Ross	4/7	eyes & tonsils	M. D.	eyes treated
15	Bessie Bates	4/7	adenoids & st. sh.	Disp.	treated
15	Helen Conerose	4/7	3 d. teeth	Dentist	"
15	Sarah Crossley	4/7	eyes 3/4 2 d. teeth	Disp.	"
15	Mary Crossley	4/7	anaemia	M. D.	"
15	Jean Coates	4/7	eyes (headache)	M. D.	not "
15	Helen Dodge	4/7	st. sh. flat chest	Parent	" "
15	Mary Delaney	4/7	1 d. tooth	Dentist	treated
15	Mary Decatur	4/7	poor nutrition nervous	Parent	"
15	Katie McFadden	4/7	eyes (ch. glasses)	M. D.	promises
5	William Pateley	4/7	eczema	Nurse	treated
14	Fred. Kind	4/7	lac'd ex'd finger	Nurse	"
6	Mary Holsey	4/7	ringworm (T. C.)	Nurse	"
6	John Deering	4/7	eyes (¾ headache)	Disp.	left
5	Charles Paterson	4/8	contusion of wrist	Nurse	treated
12	Frank Ellis	4/8	eyes (2/3)	M. D.	not "
4	George Long	4/8	eczema	Nurse	treated
4	Louis Nusbaum	4/8	acute sore throat	exclude	returned 4-11

J. R. Boice EXAMINER

* "Treated," "glasses," "operation," "not treated," "promises," "left school."

System of Medical Inspection, W. S. Cornell. Form No. 9.

Fig. 13.—Record of defective children and their defects.

cards intact.[1] This system, which is very expensive, since the clerical work is threefold, is also inefficient, for the simple reason that the only arrangement of a list of defective children

[1] In the system of individual cards just described and criticised, it is the custom to use cards of a blue color for the recording of physical defects found, and red cards for *excluding* contagious diseases.

is in chronological order, and any other arrangement is simply a disturbance of this best one. The man who proposed it was evidently imbued with the idea that, because the card-index system is an advance in bookkeeping, every entry made in business must be upon a single card. The actual result in Philadelphia, at least, has been that these cards are turned in by the thousands at the central office and very little done with them. The useful information which might have been gathered by keeping the school lists intact is now made difficult to obtain. The only good reason for such cards is that the school nurse, if there be one, can handle the record of each case separately, finishing up some records, and holding others back until treatment or failure is assured. It must be evident, since all cases do not need a nurse and the majority of cases do not secure the services of one, that, since the nurse's time is less valuable than the physicians, it would be a better system for the nurse to take these lists and copy off for herself on individual cards the cases that she has to handle. In this way her records and the inspector's records are each kept complete and separate.

If, however, a nurse be assisting the school inspector, the individual card system is the best for her purpose, and Dr. Newmayer has suggested a remarkably good card, which can be filled in (*except the items of diagnosis and recommendation*) by the teacher if the case is one sent to the office at her suggestion, or by the nurse if the case is one of the routine examinations. In the latter case the nurse copies the information from the "Record of Defective Children."

By this method the extra clerical work entailed by the use of the cards is placed on the nurse, who will use the cards in her work, and in a comparatively few and scattered cases on the teachers.

Since the filling in of the name, address, school, teacher's name, and suspected trouble is only a matter of about thirty seconds, a single case now and then will not burden the teachers, and in actual practice has rather wakened them up.

Dr. Newmayer's card, with the attached return-stub, is here shown:—

School..............Teacher..............Room No......
Name.................... Address......................
Date........... Sent to Medical Insp. for..................

Diagnosis.........................
Referred to physician—Dispensary—Nurse.
Excluded—Date..............Returned..............
Treatment by nurse—at home—at school.
Dates of treatment—
Total number of treatments—
Results—Cured—
Improved—
Not improved—
Nurse Medical Inspector

To the Teacher
Name..........
Disease or defect..........
Action recommended..........
Date..............Med. Inspector

Fig. 14.

Inspector's Reports.

Report to the Central Office.—If a city system of inspection be in operation, a summary of work done should be sent to the chief medical inspector. Such report may be made daily, weekly, or monthly, the practice differing in the various large cities. The weekly form appears most practicable, as a summary requires less actual writing than a detailed daily statement, is more likely to be reviewed with interest by the chief inspector, and in addition presents a more comprehensive idea of the prevalence of disease at the time in the district.

Such a summary, if in the form of a weekly report, should give the section of the city covered by the medical inspector the number of schools assigned to him, the visits required, and the visits made. The number of children sent to the inspector by the principal and teachers should be noted, as well as the number systematically examined, these together giving the total number of examinations. The number of recommendations for treatment for the cure of physical defects, the number of exclusions of cases of contagious diseases, and the number of vaccinations are also noted. Following this summary should be a list of the physical defects for which notices have been issued, and the diseases for which pupils have been excluded. Such a list is well worth the formal printing upon the report, since the use of a well-prepared list serves to standardize the summary, forcing

the use by the assistant inspector of medical terms desired by the chief inspector, and thereby facilitating the grand summary of the inspectors' work by the chief inspector.

This weekly report may also give the number of children remaining out of school and the number of children returning to school during the week, the actual names of such children to be carried along. Such a scheme is theoretically a very good one, since it assures the watchful supervision of excluded cases by the inspector—at least it does if the inspector be honest. Sad experience, however, including my own during five years of actual inspection, shows that the accurate and truthful carrying along by the inspector of excluded children is a most difficult task, provocative of much prevarication on his part. It is very disconcerting to the inspector to realize on Friday night that he has forgotten to look up four or five children who were excluded the week previous, but must, nevertheless, be reported upon sometime before Monday morning. Of course, in a small district or a district in the better parts of a city, the number of exclusions is so small that this entry gives very little trouble. But in the poorer sections of a large city, where the problem really is large enough to require some formal record, this work had better be left to the school nurse, who by means of her own card system carries all cases excluded, as well as the others, along until some definite final action is secured.

The printing of the major defects on this report is a valuable aid in the training of the medical inspector, and is essential to the compilation of a concise, accurate annual report.

Annual Report.—From the inspector's summary a weekly, monthly, and annual report of the total work done is tabulated by an office clerk. In this manner accurate information as to epidemics of scarlet fever, measles, acute conjunctivitis, and other infections is secured.

A well-prepared statistical report means an intelligent comprehension of the work by the school authorities and by the public. The latter are not physicians, and the general results of the year's work may well be put into plain English for their benefit, even though the details be technical. An annual report properly prepared is the principal agent in securing continuance and development of the work.

A written summary of the physical condition of a number of children should state, first, the number of "normal" and "defective" children, the number of defects existing, and the proportion of the "defective" children who are normal except for decayed teeth. The physical defects enumerated should be the essential ones only, with the omission of unimportant secondary symptoms and signs.

In the chapter on the Prevalence of Defects and Diseases (pages 568 to 577) are given several statistical reports on the physical condition of school children. To these the reader is referred.

THE CORRECTION OF DEFECTS.

Notification of Parents.

The correction of the physical defects found in school children may be attempted by the persuasion of the parents or by the legal compulsion of the parents by the public authorities.

At the present time we must depend upon the method of persuasion, reaching the parents principally by good medical work intelligently presented by a printed notice or by personal interview. In the latter case the interviewer may be the inspector, the teacher, or a social visitor (usually a school nurse).

The method of legal compulsion is a proper one in certain cases, but few attempts have been made to exercise it. Granting that many of the defects found in school children by the inspector are minor in character and do not warrant proceedings against the parent on the ground of neglect, the fact remains that in a large city thousands of children grow up anemic, flat-chested, myopic, eczematous, deaf,—not to mention ugly,—simply because remediable defects have been neglected by parents who have had two or more official notifications of the existence of these defects and their consequences. Poverty in these cases is no excuse, since free medical service can always be secured from the large hospitals. It is certainly far worse to rear children in this manner than it is to maintain a puddle in the back alley or to keep chickens in the cellar. In New York City about 40 prosecutions have been brought against parents by the Society to Protect Children from Cruelty at the instigation of the

Health Department, but these were all cases easy to pros. because the general home conditions were bad. Even if Society undertook only this class of cases, it would be swamped with work. So far as I know, no action against an obstinate, but well-to-do parent has ever been taken. We need special legislation empowering the health or school authorities to act in such cases.

Taking up in detail the different forms of persuasion at our command, we have first the written or printed notice to parents to be taken home by the child. The manner in which such notification is done is most important, since parents must be convinced of the existence of the defect and the benefit of treatment. A general utility notice, to be filled in by the inspector, may be used, but is far inferior to a specific notice bearing on eye-strain or discharging ears as the case may be. The latter can carry special (printed) information upon it which will make the parent *think*, and, in the case of the ignorant poor, is absolutely necessary. Such notices have not yet come into general use in this country. The city of Philadelphia issues notices for decayed teeth and for nasal obstruction designed by the writer and exhibited below. An allusion to a "green card" and a "red card" in the London Health Report in connection with parents' notices for defective vision leads me to believe that an attempt is made in that city to distinguish and emphasize the worst defects.

I am glad to state that my friend and colleague, Dr. Harlan Shoemaker, several years ago appreciated the greater force of a direct notice to parents and had mimeographed separate notices to parents of the existence of poor eyesight, enlarged tonsils and adenoids, and decayed teeth in children, together with a warning of disastrous results.

Several useful forms for parents' notices are here shown:—

A general blank form suitable for all defects. In case notices are used, this notice is used for miscellaneous

3:—

MEDICAL INSPECTION OF SCHOOL CHILDREN
NOTICE TO PARENTS

____

Dear Sir:—This is to notify you that

________________________________, a pupil in the ________________School is in need of medical attention ____ ________________. You are advised to consult a physician, hospital or dispensary without delay.

Very truly yours,

Date________________ ________________________

Fig. 15.

2. A notice for defective vision:—

MEDICAL INSPECTION OF SCHOOL CHILDREN
NOTICE TO PARENTS

Mr.________________________

Dear Sir:—This is to notify you that

________________________________, a pupil in the ________________School possesses **defective eyesight**, and appears to need eyeglasses. You are therefore advised to consult your family physician or an eye specialist at his office, or a hospital dispensary.

Very truly yours,

Date________________ ________________________

NOTE—If the pupil complains of (1) **headaches**, (2) **tiring of the eyes after reading**, (3) **blurring of the printed words when reading**, the words are underlined in ink.

Fig. 16.

3. A notice for internal squint:—

MEDICAL INSPECTION OF SCHOOL CHILDREN
NOTICE TO PARENTS

Mr.______________________________

Dear Sir:—This is to notify you that

____, a pupil in the ______________________School suffers from internal strabismus of__________eye. You are earnestly advised to consult your family physician or an eye specialist at his office or an eye dispensary.

Very truly yours,

Date__________________ ____________________________

(OVER)

Fig. 17.

Turning in of the eyeball (strabismus) usually results from eye-strain (in both eyes), and in very young children can be cured by proper glasses. *The child will never outgrow it.*

If neglected, an operation is necessary to straighten the turned-in eye. Even after operation its vision will remain defective.

Fig. 17, reverse side.

4. A notice for suspected eye-strain:—

MEDICAL INSPECTION OF SCHOOL CHILDREN
NOTICE TO PARENTS

Mr.______________________________

Dear Sir:—This is to notify you that

____, a pupil in the ______________________School suffers from headache and tiring of eyes after reading.______________________________
You are therefore advised to consult your family physician or an eye specialist and ascertain whether eyeglasses or medical treatment is needed.

Very truly yours,

Date__________________ ____________________________

Fig. 18.

5. A notice for nasal obstruction:—

MEDICAL INSPECTION OF SCHOOL CHILDREN
NOTICE TO PARENTS

Mr.______________________

Dear Sir:—This is to notify you that

______________________________, a pupil in the

____________________School appears to suffer from nasal obstruction. You are therefore advised to consult your family physician or a nose and throat specialist without delay.

Very truly yours,

Date__________________ ______________________

(OVER)

Fig. 19.

Obstruction of the nose is usually caused by (adenoid) growth of spongy tissue located far back at the opening of the nose into the throat. These growths can be felt by the finger introduced into the mouth, although this procedure requires skill and experience. They can be removed and healthy, free breathing thereby restored. If the growth is small and the obstruction is only slight the condition can sometimes be cured without operation.

Adenoid growths frequently cause nasal catarrh, deafness from extension of catarrh to the ears, frequent sore throat from mouth-breathing, and flat chest and stoop shoulders from improper breathing.

Fig. 19, reverse side.

6. A notice for decayed teeth:—

MEDICAL INSPECTION OF SCHOOL CHILDREN
NOTICE TO PARENTS

Mr.______________________

Dear Sir:—This is to notify you that

______________________________, a pupil in the

____________________School suffers from____________ decayed teeth. You are advised to take your child to a dentist without delay.

Very truly yours,

Date__________________ ______________________

(OVER)

Fig. 20.

The temporary, or milk, teeth should not be allowed to decay. Naturally they are pushed out by the permanent teeth, which succeed them. The permanent teeth should last through life. Decayed teeth frequently cause indigestion from the swallowing of offensive material in the mouth and from improper chewing of the food.

Decayed teeth frequently cause sore throat because they harbor germs in the mouth.

The loss of teeth produces irregularity of the remaining teeth and unfortunate facial appearance.

Fig. 20, reverse side.

7. Notice for stoop shoulders and flat chest:—

Dear Madam:—

This is to notify you that ——— ——— is suffering from stoop shoulders. Stoop-shouldered children are likely to be also flat-chested, and therefore more liable to consumption. Stoop-shouldered children do not appear as healthy and strong as children with straight figures. Please see that —— tries to stand straighter.

Medical Inspector.

Fig. 21.

8. A notice for pediculosis:—

BUREAU OF HEALTH

NOTICE TO PARENTS

When a pupil of the Public Schools is excluded by the Assistant Medical Inspector on account of having an unclean head, the following remedies may be resorted to in order to cure the condition:

Take equal parts of kerosene oil and sweet oil—mix and saturate hair and scalp thoroughly with the mixture. Tie head in towel and leave it so one night. Next morning wash the child's head with hot water and soap, and remove all traces of the oil. After thoroughly drying, saturate with vinegar, separating hair and strands, and brush with stiff brush.

After such treatment, the pupil may return to school and inform the Medical Inspector what has been done; or the parents may send a note, indicating what treatment pupil has had. If result is satisfactory, pupil may be readmitted.

(After New York and Philadelphia.)

Fig. 22.

The result accomplished by means of printed notices to parents vary greatly with the individual inspector and the character of the population. A good inspector writing intelligent notices and talking to the child about the benefit of treatment can secure action by parents in about 30 per cent. of cases. The average inspector secures action in a little over 20 per cent. of cases. An indifferent inspector probably falls down to 5 or 8 per cent. Exact comparative results of medical inspection among the poorer class using the printed notice *versus* the school nurse are given in the section on the results of medical inspection. Comparative results among the better class have not come to the writer's attention.

Personal interview with the parent may be by the teacher direct or through the medium of a home visitor, usually a school nurse. It is evident that a personal interview is as much superior to a printed notice in securing results as a salesman is superior to a printed advertisement. The expense is the only deterring factor, but a powerful one. In the better American class a personal interview is a superfluous expense until the cheap printed notice has been tried. In the foreign quarter of a large city personal interviews with mothers are necessary, since a notice printed in English is thrown away or preserved as a prize certificate of good conduct. The expense per visit is also small in these cases because of the nearness of the child's residence to the school, often half a dozen cases living in one block, and in New York even in one tenement house. Success certainly follows the visitor's work, although the credit must be divided between the visitor, the official and revered school authority, and the free dispensary. The sections on the school nurse and the results of medical inspection consider this matter further.

Co-operation of Teacher, Child, and Parent.

Co-operation of the Teacher.—The same human motives and professional efficiency that prompt a teacher to inspect her children for possible physical defects will cause that teacher to aid in their correction.

The teacher can, first of all, exercise the art of preventive medicine. She can keep her room well ventilated, abolish the

common slate-pencil box and the common drinking cup, see that her children have proper-sized desks, give the children nerve-resting periods of relaxation and changes of work, and treat them so gently that nerve-storms are unknown. My own mind goes back to one of my old high-school instructors, now a professor in Lehigh University, who used to open wide his windows between every class hour, so that each new class came into the room to be greeted with pure air of outdoor temperature. The impression made upon us boys has never been effaced, and at our class reunions some one regularly brings up "Balder" and his devotion to fresh air. On the other hand, I have gone into so many class rooms in the elementary schools whose foul, warm atmosphere almost made me sick that it is proper to call attention to this neglect of the understanding and practice of ventilation by school teachers, almost a curse in our school system. Half the teachers who die of consumption are the victims of their own ignorance or neglect.

Let our teachers, therefore, *live* health as well as *teach* it. Then children will sit up straight from habit, keep their teeth attended to, breathe through their noses, and enjoy fresh air.

As to the correction of existing defects, we have already remarked that a teacher can test the visions of her pupils with a 10-cent card, in about two minutes each. Similarly, she can effect the procurement of glasses by a few personal kindly words spoken quietly to the child after school. The fact that the teacher takes an interest in the case is enough to insure action in the case of the average child.

Not only can the teacher reach the child. The principal can reach the parent. In our large cities the schools have supervising principals, whose duties at the present time are rather vaguely defined, owing to the fact that they have been trained in Herbart and Aristotle, but not in business system. It seems to me that a supervising principal's chief duty is to look after those children who are not fitting the curriculum. He should keep a card-index record of every "left-down child," with monthly reports on the case. This card should carry upon it a record of the health, the home environment, and the school history. The supervising principal should keep another record of every child who is physically defective in marked degree. In this way he

will justify his job by making brighter and healthier children. In the better sections of a city, where intelligent parents live, personal interviews with parents should be had by the principal himself, not by home visitor, who, in this case, is an unnecessary expense.

Here is a card that is literally worth its weight in gold:—

.................School District, No.................191..

Mrs...............................

....

Dear Madam:—Your child, ... **has been found by the Medical Inspector to be suffering from defects which greatly interfere with his/her work at school.**

Kindly call at the school on .... **at** .... **o'clock in order that we may explain to you what can be done to help her./him.**

THIS IS VERY IMPORTANT.

....

Principal.

Fig. 23.

Let me not be misunderstood. The fault lies not with our teachers, but with their training. They cannot even interpret the medical inspector's record on the child's health card. When our normal schools wake up, and spend a few dollars for actual specimens instead of depending entirely upon paper descriptions; when teachers are taught to look into a child's mouth instead of learning about intestinal villi and convoluted renal tubules, the teacher will know something about the subject and act with interest and with confidence.

The signs are in the air that such a time is coming, and our larger universities, such as the University of Pennsylvania, Columbia, and Cornell, already offer courses to teachers and (the University of Pennsylvania) to medical inspectors to supply the beginning demand for knowledge in this field.

Co-operation of the Child.—Since the child must be first *taught* to co-operate, the credit in this case must be partly given to the teacher for her educational work. As we will see, this work is as good an investment as any made by the community.

The importance of bringing children to an understanding of health matters cannot be exaggerated. It is remarkable today how the routine work of medical inspectors has centered the attention of the children upon their nasal breathing, the condition of their teeth, and their eyesight. In the schools that the writer inspected, the knowledge seemed to spread that habitual headaches signified eye-strain, for probably a score of older children have applied for examination of the eyes on this account. Compare this simple, but all-important information on health with the theoretical teaching on hobnailed liver, chyme, chyle, and the tricuspid valve found today in our schools.

If a systematic attempt were made to teach and practise ventilation, exercise, and the care of the teeth, what a revolution would be wrought in the homes of these children, full of mission and enthusiasm! A few other simple facts about the eye, nose, throat, chest, nutrition, and diet would save the life of many a baby brother at home.

Revolutions have been wrought in at least three fields already in this manner, namely, in the saving of infants, the prevention of tuberculosis, and the care of the teeth.

In May, 1910, Dr. Joseph S. Neff, Director of Public Health and Charities of Philadelphia, instituted a system of school lectures on the care of babies during the summer. These lectures were given by several medical inspectors in the poorer quarters of the city. School nurses assisted. Live babies, milk bottles, nipples, boric acid solution, and babies' clothes were shown to about 10,000 girls between 9 and 14 years of age. The writer, who helped in this work, adopted the plan of also giving out mimeographed circulars on the care of milk in the store and at the home, how to wash milk bottles, *et cetera*. In this way the information was not only given verbally, but securely transferred to the mothers at home. The effects of the lectures must have been great, for the children in the Wharton School, who were given a test the following day, showed practically a perfect recollection of an hour's talk.

The instruction of children in the value of fresh air, good food, and sufficient rest as preventives of tuberculosis has been carried on both by large municipal exhibits in New York, Philadelphia, Washington, and other cities and by traveling school

exhibits, which in Philadelphia, at least, have reached tens of thousands of elementary and high school children. The Pennsylvania Society for the Prevention of Tuberculosis conducted the Philadelphia exhibit and supplemented it by special lectures at the different schools.

Practical work toward hygienic habits can be encouraged in the rural schools as well as in those of the city. For example, in Minotola, N. J., a farming section into which Italian immigrants have recently come in large numbers, Supt. Conners publishes a little paper designed to bring the home and school closer and encourage the cause of education. In an issue at hand we find the following:—

When the supervising principal inspected hands at Landisville recently, only two of ninety had dirty hands. Can you beat that?

The county superintendent and supervising principal have both had occasion to compliment the Buena boys on their neat appearance. Hair always well combed in this school.

Wheat Road Primary reports 37 pupils with individual cups, 19 with towels, and 7 with combs. How is that?

Oak Road lost all its library books last week. No; not stolen. Mr. Conners is gathering all libraries, except those new this year, and is arranging a number of traveling libraries by reassorting them; and each school will thus get a supply of new books every three or four months.

Joe Paliughi, recently arrived, at the time, from New York, broke his arm while wrestling at the East Vineland School. It happened that Superintendent Conners was visiting the school in his motor that day, and he hurried the boy to Vineland, where the arm was set. Joe has decided that life in East Vineland is too strenuous and has hastened back to quiet New York. Last report was that the arm was doing nicely.

The Certificate of Merit for Excellent Attendance will be given only to those missing five days or less during the year. All absence counted, excepting where a child is kept home by reason of some one else in the family being sick and the house being quarantined. With none excused last year there were over 200 to get the ten-day certificates.

Books will be given to pupils perfect in attendance and not tardy from the first day of school to the last. Over fifty books were given last year, and we have reason to believe that the children were delighted with them.

All children between the ages of 7 and 15 will be required to be in school every day after October 20th, unless sick. If a parent can show that he is so poor as to need the help of a child over 14, such

child may be excused by applying to the Board. The parent who spends his money for drink or squanders it in other ways will not be considered as needing his child's help.

The care of the teeth has been the most popular subject in the great awakening of the children. Booklets have been distributed, toothbrush drills taught to classes, entertainments gotten up with the care of the teeth as the *motif,* and prizes awarded for essays. I have before me a little program from the Thomas School, Philadelphia, used at a home and school meeting.

PROGRAM.

HOME AND SCHOOL MEETING.

Eighth and Clearfield Sts.

Friday, November 4, 1910.

2: 30—First Floor Reception.
2: 45—Swedish Dance } Children from
Indian Song } Second and Third Floors.
3: 00—Display of Teeth.

Tooth Song.

..................................Miss Emma T.
Words .... Prophylactic Brush Co.

3: 30

Dr. H. P. H.

"The Care of the Teeth."

Special Music.

Violinist .... Madeline M.

Tooth Show.

I.—Ladylike.
II.—Gentlemanly.
III.—Rooseveltian.
IV.—Mother When Teeth Are *Not* Brushed.
V.—Dentist.
VI.—Self in Mirror.

Tooth Song.

"Will you promise, oh my darling
To brush your teeth a little?
It's all I ask—a little
I do not want to scold,
You will not want them funny, hollow, empty—
When you're old.
You'll be glad I made you brush them
You'll be glad I seemed to scold
Asked you morning, noon and night-time
If you brushed them—
When you're old."

The *Survey* of December 31, 1910, says: "Careful examination and especially actual treatment of the decayed teeth of school children is a phase of medical inspection which is getting more and more attention. In Rochester, N. Y., the dental society, which with the assistance of the Health Association and the Board of Education has maintained a free dental clinic for five years, conducted a three weeks' campaign in the public and parochial schools, which ended with a mouth hygiene mass meeting in Convention Hall. Forty schools were visited, and lectures illustrated with 200 views delivered. A small booklet containing reasons for keeping the teeth clean was given to each child. Dentists from all over the country contributed their services. Dr. John P. Corley, of Sewanee, Tenn., and William H. Allen, of New York, were the principal speakers from outside the city. One of the schools gave a special toothbrush drill at the mass meeting, at which the mayor awarded to the dental society the prize of $1000 given by William Hodge for the most deserving charity in the city."

A press notice states that in Lynn, Mass., the school board has issued a notice that all public school pupils shall brush their teeth on arriving at school in the morning.

General cleanliness is a matter to which too little attention has been paid in the past. Any teacher can make her children keep their hands clean with very little trouble. In the case of dirty clothing the matter, of course, is difficult if extreme poverty exists. It is my own experience, however, that teachers are afraid of offending parents, instead of which they should realize that they are rather in a position to demand an apology than to make one.

Not only may the school be made an influence for better habits of cleanliness, but the public libraries, also, may exert a powerful influence by having the librarians refuse books to children with dirty hands, and by posting conspicuous notices to this effect.

The teaching of cooking in the schools is one of the great modern movements, and in the poorer quarters of the city of Cleveland the scope of the work has been enlarged by feeding the poorly nourished children, and teaching dietetics through the children. The mothers are invited to the school also. In this

way the problem of malnutrition is best attacked,—by teaching ignorant mothers to cook properly and by also teaching the school children, insuring better-nourished children in the next generation.

Co-operation of Parents.—Co-operation and appreciation, on the one hand, and indifference, poverty, and resentment, on the other, summarize this phase of the problem. Some of the happiest moments of this work, which, like missionary labor, is efficient in proportion as a man puts his enthusiasm and extra services into it, are derived from the grateful expressions of parents who realize that the health of their children may be materially benefited. The poor are not behind the well-to-do in this respect, and many a woman has asked me how to procure the glasses which she could not afford to buy.

Far worse than poverty to combat is indifference or active hostility. The fact remains that the large majority of our recommendations are ignored, except by the foreign poor, who accept them as orders from a wise and powerful government. I have notified parents that their child had but one-third of its normal vision and been told to mind my own business. A week previous to this writing, a very respectable man neatly disposed of me by writing on the back of my recommendation blank in blue pencil: "My dear Dr.: Kindly leave this to me. W. H. L." Another case, a little girl in the Allison School, has one-third vision in one eye and one-fifth vision in the other. She had a daily headache for a month. Two official notices were sent to her parents, but they professed to believe that a breakfast of toast and oatmeal is the remedy for the headaches. Most peculiar of all are the parents of mentally deficient children, who usually resent the suggestion that any actual defect exists.

Occasionally, but not frequently, parents object to the exclusion of their children because of contagious disease. This is particularly true of pediculosis cases, and those of German measles. The rash of the latter disease exists only for a day or two and leads to endless disputes with parents and occasionally with partisan physicians who see the child for the first time after the rash has disappeared. Occasionally these hostile parents learn, to their sorrow, the correctness of the medical inspector's diagnosis. I well remember in the McKinley School

in Philadelphia a colored woman who protested against the exclusion of her child for measles, and who subsequently suffered the loss of two of her children by reason of contagion from the child excluded. According to report, there is but 1 case in which a parent has instituted a lawsuit, the basis of which was the denial of the right of medical inspection by the municipal authorities. This occurred in Chicago several years ago and was decided against the parent by Judge Ball, of the Superior Court, who held that the medical inspection of schools was constitutional.

In this connection several amusing anecdotes, some authentic and some apocryphal, have appeared from time to time. In the Massachusetts Health Report, 1907, are quoted several instances. A child has been supplied with glasses left by a recently deceased grandmother. A father held an apple and an orange in his hands, and, finding his child could distinguish them across the room, declared nothing was the matter. Another father tried his own glasses on his child, and because the child could see nothing refused to buy others.

Two good stories gathered from the newspapers may be recounted. A mother, upon being notified that her youthful son very evidently needed a bath, wrote as follows: "Teacher, Johnny ain't no rose. Learn him; don't smell him." Another mother, upon receiving a notice that her boy suffered from astigmatism, wrote that she had whipped him soundly and hoped that he would not do it again.

The best insight into the parental attitude is obtained by reading the actual letters received from parents, a number of which are here given and which speak for themselves:—

Dear Sir:—

I wish to thank you very much for paying for Elizabeth's glasses. It hurt me very much to accept them as I never received anything in that way before. But as things are at present I could not spare the money. But as long as her Father is a sober industrious man I do not think we did any wrong in accepting them. I again wish to send thanks from Elizabeth.

I remain Yours,

R——

Miss Eichler:—

We received the note from the Doctor and will say that we give him medical attention when he needs it. We know that George has head-

aches but when he comes home from school he complains of a boy in the 3rd grade by the name of Andrew Aimeck who knocks him down and jomps on him. I wish you would give this your attention. I know boys are all alike but this boy is mutch larger.

Very Respectfully Yours, S——

To WHOM THIS MAY CONCERN:—

I received your letter stating that Edna Ross (my Sister) is in need of glasses. It is utterly impossible for me to purchase her any as my husband is out of work and her father does not contribute one penny towards her support and I am obliged to share the little I have with her and have two infants of my own. Her mother is dead and the Father placed the child on my hands. Yours Respectfully, H——

To THE DOCTOR:—

Jennie was not born with her eyes crossed they were perfectly strait until after she was three years old and then they crossed. I could never tell what caused it unless it was from a fall down stairs which she got about six months before. Yours truly, H——

MISS GROTH ALSO MISS MCKIBBY:—

I don't think you teachers know what you want anyway you send them home to get glasses then you want to send the truant officer after them you knew that she was sent home for glasses only you want to make a fool out of the parents i done my duty to my children you mustn't think that i am a millian air i had to get 2 of them glasses you can send ten truant officers after me if you like you let her go to the haspital this after to get her glasses tested for i don't think much of it.

F——

MISS HILL:—

I received a note wich Martha brought home to instruct me to take her to a doctor. now I want you to know that I or my can Judge wen Marth neads medical treatment if Martha is sick I keep her home. I send Martha to school to be instruction my wife has ask you to give Martha some lessons to bring home and my wife would instruct her you complain about Martha she keeps her mouth open well she does just as any other child would wen intrested or surprised it is more or less a habit with her and no catarrh she has a slight cold I will atmit but nothing more. So I hope you will give her some lesson to bring home and we will instruct her the best we can. W——

(Nurse's Memorandum.)

DR. CORNELL:—

I have just learned that Annie Jaff returned to school yesterday, with the statement that the doctor at "The Children's Hospital" said she was all right and should not remain. The head nurse informs me that such is not the case, the mother refused to allow her to remain. If I can get the parents consent she can be readmitted after next week.

Very Truly, H——

The necessity of full parental consent before attempting the correction of children's defects should be remembered, since otherwise a parent would have ground for legal action against the inspector. An inspector has no more right to extract a tooth or give a pill in school than he has upon the street, because the child is not a free agent. In cases of necessity at any place a physician is justified in taking such measures as will save life or limb, but the quicker the enthusiastic young physician realizes that hungry lawyers exist, the better for his peace of mind. For this reason, if a child is taken by a nurse to a dispensary for treatment, particularly operation, a parent's permit should absolutely be secured. No operation is entirely without danger.

The form here shown is well suited to this purpose:—

....191....

To the Principal,

..................................*School*:

I hereby authorise the School Nurse to take my child

....

to an institution to have her/his physical defects properly treated.

....
Parent's Signature,

....
Residence.

Philadelphia Public Schools,

Fig. 24.

It is a good plan to avoid holding clinics in schools, since this may cause weird rumors in a neighborhood peopled by the ignorant and credulous. Readers may remember the riots in New York City, on June 27, 1906, when the schools were stormed be excited mothers demanding their children. In these cases the cause of the riot was 83 adenoid operations, which had been performed in the schools by three specialists assisted by seven health inspectors and as many nurses. The rumor got around the neighborhood that the children's "throats were being cut" and an excited mob demolished several windows and doors before the children could be dismissed. A press dispatch before me, dated October 5, 1906, tells of a similar riot in front of a public school near the Williamsburg bridge, in Brooklyn. According

to the newspaper, the cause for this riot was the institution of active measures in the school for the extermination of trachoma. About 1500 Italian women fought the police desperately and actually attempted to batter down the doors of the school building. Here, again, the trouble was, of course, based on a misapprehension, but such an event shows the unwisdom of associating the public school system with hospital work in the minds of the public.

The School Nurse.

A review of the official work done by nurses in our large cities shows that they are principally employed in the medical inspection of school children and the reduction of infant mortality. A few cities, notably New York, employ nurses in the fight against tuberculosis, but in the majority of our municipalities this particular field is still supplied through volunteer private agencies, such as the Phipps Institute in Philadelphia. Social service work in connection with the dispensaries of various hospitals, which will be mentioned again, is, at the present time, not a feature of any of the hospitals supported by the municipality.

The work of school nursing in New York City requires 140 nurses, a development far ahead of any other city and an indication of the future extension of the work elsewhere.

Originally they were appointed to treat children suffering from minor contagious diseases, and thereby prevent the loss of time suffered by children excluded from school. Dr. John J. Cronin, of New York City, writes:—

"When I state that in the city of New York, during a period of three months, out of 24,538 children who were actually excluded from school for longer or shorter periods, only 400 had serious diseases, imperiling their own lives, the others being more of the character of 'nuisances,' it will be seen what an advantage such a system may prove from an educational point of view."

In Philadelphia there is a corps of school nurses employed by the Board of Education.[1] The school nurses include 1 head

---

1 A second corps employed by the city during the summer is mentioned in the final paragraph.

nurse, Miss Anna L. Stanley, and 9 assistants, with a clerical assistant to the head nurse. Beginning in the year 1903 in a small way,—1 volunteer nurse sent into the schools by the Visiting Nurse Society,—the work has steadily grown in scope and volume. The salary of the assistant nurses is about $700 a year with a two months' vacation, and a working day beginning at 9 in the morning and ending somewhere between 4 and 5 in the afternoon.

The school nurses act as nurse, visitor, and escort. Origin-

Fig. 25.—Daily visit of nurse.

ally intended to treat school children afflicted with ringworm, pediculosis, and like minor contagious diseases, and so save these children from exclusion, they have now in our large cities become the recognized agents for the carrying out of all the medical inspector's recommendations for the correction of physical defects.

The work of the school nurse is in (1) the school, (2) the children's homes, (3) the hospital dispensaries.

School Work.—The nurse visits probably 4 schools a day, if she is employed in the poorest districts of the city, but a larger number in the resident sections, where few if any treatments are given in school and the work is mainly that of home visitation.

She first reads over the ~~medical inspector~~'s daily record of physical defects and diseases encountered, and sends for the children whose names are recorded. Those children whom the inspector has marked for treatment are quickly disposed of, zinc ointment and ammoniated mercurial ointment being dabbed on plentifully. In each case the written recommendation of the inspector is followed. Occasionally a ringworm is painted with iodine or a chronic eczema stimulated with oil of cade or similar preparation.

In those schools where the nurse arrives daily before the medical inspector, or where the medical inspector does not visit the school daily, she rings an announcing signal on the electric bells throughout the school precisely as does the inspector. This method, of course, requires a good deal of initiative on her part, as many minor cases of impetigo and eczema are seen by the nurse before coming to the inspector. It is a safe procedure in these cases to apply without delay any harmless remedy indicated. Boric acid and zinc ointment are typical remedies. Personally I have seen so many rather indefinite cases cured by this treatment that, although science suffers thereby, confidence increases, and one comes to agree with a well-known surgeon who said jokingly of skin diseases that they are divisible into two classes, those cured by zinc ointment and those not. On the other hand, the nurse must be exceedingly careful to avoid either doing a child a mischief or placing herself in the unfortunate position where such a claim can be made by ignorant parents. For this reason deep wounds involving more than the skin, imbedded foreign bodies, bad sprains, etc., should be promptly sent home with instructions to the parent to seek at once a physician or dispensary.

The nurse leaves for the medical inspector a memorandum of cases treated *de novo* by herself. An understanding with the inspector whereby the numerous cases treated with zinc ointment are passed over without memoranda shortens the list and gives it enough importance to make it worth reading.

The cases of defective vision, decayed teeth, and other remediable defects are next taken up and inquiry made of the children whether the official recommendation has been heeded or not. If the former, the inspector's record on the "Defect

Card" is finally filled out,—"treated" or "glasses" or "operation." If the latter, a systematic campaign is begun to secure action, first the child and then the parents at their home being urged to consent.

The school work finally includes an occasional crusade for cleanliness by a search for pediculi in the hair of the children.

Fig. 26.—Nurse at work.

This certainly should never be done as a general procedure throughout a class, unless the teacher requests it because of their evident existence in several of the pupils. Indignant parents are liable to take offense at the forced examination of their children, and among older girls considerable mental distress results. On the other hand, there are occasions when one-half a primary school has been shown to possess head-lice, and

wholesale and heroic measures are needed. On one occasion a teacher informed me that the school nurse had examined the 36 girls in her class, and found pediculi in the hair of 24.

Home Visits.—Home visits, as a rule, are for the purpose of urging parents to act, and not for the actual treatment of cases. In the latter class are home treatments for the very poor and ignorant when suffering from pediculosis, scabies, or general filth. In these rather exceptional instances the children are given a good scrubbing.

It is well worth while to mention in this connection the success of the nurses in securing co-operation from hitherto indifferent parents. The results have been so marvelous that the suggestion has been made to appoint a sufficient number of nurses, or women visitors of some sort, to cover all the schools of the city instead of simply the slum districts.

Dispensary Visits.—Many children are escorted to hospital dispensaries by the nurses. These are cases who are too young to find their own way, and whose mothers are employed during the day. Occasionally an urgent case is followed up by the nurse from school to home and to dispensary in order that the child's eyesight or life may not be endangered by neglect.

The routine daily work of the nurse is so arranged that if possible the home and dispensary visits may be made outside of school hours.

There is no question as to the value and propriety of the nurse's services in treating minor skin diseases of a contagious character and thereby reducing the time lost by exclusion from school. Similarly, the visitation of parents by the nurses for the purpose of personally urging the correction of physical defects has produced remarkable results in the poorer sections of the city, and among the foreign element, at least, is a notable aid to medical inspection.

It is a fact, however, that the major portion of the nurse's work in the school building has come to be the treatment of minor cuts, bruises, and infections owing to the appreciation of free service by the children. It must be admitted that this relief so freely and gracefully given is in reality dispensary work, subtracting in a general way from the income of the neighborhood physicians and pauperizing the recipients, just as free clothing

or free meals or free lodging would adversely affect the merchants and realty men of the neighborhood and lower the self-respect of the objects of these charities. It is well to remember this and to counsel moderation to our salary-paid inspectors and nurses with an eager desire to help humanity.

A warning note should also be sounded. The chief business of the nurse is (*a*) to shorten or obviate the period of exclusion from school of children suffering from minor contagious diseases, and (*b*) to secure the correction of physical defects by reason of personal interview with the parents. Truth compels me to state that a certain proportion of the nurse's work as at present carried on is unnecessary and, therefore, an extravagance. Thousands of bruises and scratches are "treated" which are so trifling and superficial that the act is a travesty on medicine.

Fig. 27.—Consultation—doctor, nurse, parent, and child.

Certain children become neurasthenic and love to come down to the doctor and nurse for a pleasant fifteen minutes and the delight of an "injury" without pain. Every inspector knows that in each school he has certain chronics who become such a nuisance that they are finally chased back to their class rooms at first sight. The existence of such children and the knowledge that twenty or thirty "advisements" or a dozen "school treatments" can be given in the time required for one visit to the dispensary tempt some nurses to waste time on these cases in order to present reports with figures running up into the tens of thousands, even though some of the fruits be only weeds.

Similarly, the "treatment" of pediculosis, recorded as almost a third of the nurse's work, is seldom actual treatment at all. It is simple advice. Probably not 1 case in 20 requires a home visit and not 1 case in 50 an actual head scrubbing.

There is plenty of work for the nurse to do. In the slum districts personal interviews are usually at the home because there are babies there to be tended by the mother. Nurses' crusades against pediculosis, like the trolley sweepers in a snowstorm, clear the ground at least for a while.

The nurses in Philadelphia keep on hand the following supplies furnished by the authorities, for the list of which I am indebted to Miss Stanley, Head Nurse:—

Tincture green soap, boric acid solution, boric acid powder, peroxide of hydrogen, collodion, zinc oxide ointment, ammoniated mercurial ointment, adhesive plaster, 1 and 2 inch bandages, absorbent cotton, bichloride solution, aromatic spirits of ammonia, alcohol.

Nurses' Records.—Mention has been made of the fact that either the inspector or the nurse completes the record on the medical inspector's "List of Defective Children." She terminates the case by writing in the right-hand column of the card the results secured. Thus "eye-glasses, Pennsylvania Hospital," "sent to Dr. S——" (the official consulting dermatologist), "sent to Dr. W——" (the official ophthalmologist for destitute children), "refuses," and "left school" are frequent entries. The "List of Defective Children" thus completed is returned to the medical inspector, who ultimately files it in the central office. In case the list of defective children is not carried on report

Fig. 28.—Nurse's closet.

sheets, but rather upon individual cards, the nurse should make her entries upon these.

As to the nurse's records, she requires no individual records if the medical inspector writes them for her, as under the card system just mentioned. The employment of an official to do clerical work for another receiving a lower salary is unsound in principle, as is also the trusting of destructible records by a chief to his assistant. For instance, if individual cards are used by the inspector and then turned over to the nurse, what is to prevent the latter from simply throwing into the wastebasket the card records of the difficult, unpleasant cases, and also any case in which she may have committed a fault. In such case the medical inspector is never the wiser, for he has no other record than the card thrown away. The writer has had some experience along this line. In one instance alone several hundred "decayed teeth" cards were written and handed to a nurse, never to be seen again. The latter evidently realized that the attempt at correction would be futile and thought to raise the record of her efficiency by destroying the cards. In another case a nurse, really an indefatigable and conscientious worker, fixed up 200 or 300 cuts and scratches, wrote out the cards for them, and asked for the writer's signature *ex post facto*. Probably there were not 10 cases worthy of attention in the whole lot, and either a tender heart or a desire to make a good showing to the head nurse prompted the act. If this nurse had been less conscientious she would have used the inspector's stamp and turned them in with the regular cards.

For this reason, if the nurse feels that she needs the card system, as she really does in the slum districts, where skin diseases require the record of numerous treatments, she should make out her own cards, leaving the medical inspector's list intact, and simply noting briefly thereon whether or not the defect has been corrected.

If a number of nurses be employed, the head nurse receives from each of her assistants a weekly report of the number of cases treated in school, home, and dispensary each day, together with a statement of the nature of the nurse's participation in each. In some cities a daily report is also required.

The daily report of the Philadelphia school nurse to the head nurse is here given:—

Section IV Daily report for 1 - 25 - 1911.

Schools Visited four	IV 1	2	3
	4	Dispensary	

Cases treated Old 91 New 25 Cured 18

Visits to homes Old 2 New 2

Taken to Dispensary Old 3 New 4

School Consultations Parents 4 Pupils 12

Examinations for uncleanliness 148

A. L. S.
Nurse

Fig. 29.—Nurse's daily report, on the reverse side of a postal card.

Also the weekly report to the head nurse (pages 86, 87).

The results of the school nurse's work are remarkable. Contrasting the work of the medical inspector working without a nurse with that of an inspector working with a nurse, the economy practised by the authorities in employing the nurse is easily manifest. Just as in the business world, sales are made and business better transacted by personal interviews, rather than by impersonal announcements and advertisements, so the nurse personally interviewing a mother explains to her the benefits of medical attention to her child, clears away misunderstandings as to the purpose of medical inspection, provides the solution of how to obtain medical help by offering to take the child to the hospital dispensary, and generally knits closer the harmonious relations of the home and the school. It must be remembered that present figures published, showing the increased efficiency of medical inspection when aided by the work of the school nurse, are derived wholly from work done in the poor, foreign quarter of the city, where docile foreign mothers, free medical treatment in dispensaries, and a division of labor between the doctor and nurse, all contribute to successful results. For that reason the writer does not venture to analyze the Philadelphia figures presented in the following section on the results of

Report for Week Ending, 5 — 6 — 1916.

R. L. H. NURSE.

				Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Totals	Home	Disp'y	Cured
		Date		5/2	5/3	5/4	5/5	5/6					
SUMMARY	NUMBER OF	Schools Visited		5	4	5	4	3		21			
		Old Cases		78	59	88	39	36		290			
		New Cases		[illegible]	19	17	21	48		113			
		Cured		41	29	33	5	5		113			
		Visits to Homes	Old	4	3	5				12			
			New	2	1	2	2	2		9			
		Taken to Disp'y	Old	2	3		4			9			
			New	1	12		13	5		31			
		School Consulta's	Parents	2			2	1		5			
			Pupils	17	4	15	8			44			
		Exams. for Uncleanliness						216		216			
NUMBER NEW CASES TREATED	EYE	Def. Vision		1	7	2	6			16		5	5
		Corneal Ulcer											
		Conjunctivitis				2	1	1		4			6
		Other Diseases				1	2			3			3
	EAR	Def. Hearing											
		Otorrhea											
		Other Diseases											
	NOSE-THROAT	Hypert. Tonsils		1	5		9	3		18			
		Adenoids											
		Def. Speech.										1	1
		Other Diseases			1					1		3	3
	SKIN	Pediculosis						37		37	34		34
		Eczema		1	1	2				5			6
		Pust. Derm.											1
		Impetigo				2				2			2
		Ringworm			1					1			1
		Scabies											
		Wounds		4	3	3	2	2		14			27
		Other Diseases			1	5		1		7			11
	ORTHOP.	Scoliosis		1						1			
		Hip-joint Dis.											
		Other Diseases											
		Teeth										11	11
		Malnutrition						4		4		2	2
		Nervous											
		Totals		8	19	17	21	48		113	34	22	113

Fig. 30.—Nurse's weekly report.

medical inspection, nor to offer them as evidence in what has at times been almost a controversy as to the relative credit for results due the medical examiner or the nurse. They are rather intended to show truthfully without comment the amazing number of cases handled and helped by a small corps of nurses working under the intelligent supervison of a head nurse (see pages 76 and 135).

Cases Terminated for Week Ending 5—6—1910.

HOME AND DISPENSARY.

Date	School	Name	Disease	Remarks
5-2-10	1	Lena Andelsohn	Canine Teeth	Treated at Medico-Chi.
" " "	1	Ralph Weinisbern	" "	" " " "
" " "	1	Edith Abrams	" "	" " " "
" " "	2	Michael Gibbins	" "	" " Phila. Dental
" " "	2	Michael Rubbs	" "	" " " "
" " "	2	Bridget Micholia	" "	" " " "
" " "	3	Josephine Rago	Def. Vision	Exam. at Penna. Disp. Glasses not required.
" " "	4	I. Salkind	" "	Corrected Wills Eye Hosp.
5-4-10	2	Frank Vendity	Canine Teeth	Treated at Phila. Dental
" " "	2	Antony Caputo	Def. Vision	Corrected at Penna. Disp.
" " "	3	Louisa Compare	" "	" " " "
" " "	1	Samuel Schomberg	" "	" " City Hall
" " "	1	" "	Def. Speech	Under treatment Poly. Clinic
" " "	1	David Freedman	Nasal Obst.	Treated at Penna. Disp.
" " "	1	Isadore Tonga	Canine Teeth	" " Medico-Chi.
" " "	4	Rachel Longo	" "	" " " "
" " "	1	Nathan Yudelsohn	" "	" " " "
5-6-10	4	Frank Guanni	" "	" " " "
" " "	4	George Finch	Nasal Obst.	" " Penna. Disp.
" " "	3	Tony Solani	Malnutrition	Sent to Country
" " "	4	Antonio Cirsarian	"	" " "
" " "	1	Salvatore Farrelli	Nasal Obst.	Treated at Penna. Disp.

PHILADELPHIA PUBLIC SCHOOLS

Fig. 30, reverse side.

In conclusion, it may be pointed out that municipal nursing marks a new occupation, namely, a combination between medical and social work. Just as the young woman of today who is learning to teach school children is impressed with the modern thought that success will depend largely upon the health of her pupils and that she must therefore have a knowledge of hygiene, so should our training schools realize that women are needed and

demanded in increasing numbers who possess not only knowledge of the human body, but who are also trained in making social investigation, in business system, and in an understanding of the methods of home life of our poorest classes. Just as one nurse will excel another in the operating room or as a head nurse of a hospital ward, because of inherent traits of character, so are some persons more qualified than others for special work. A sympathy for the poor,—meaning by the term, sympathy, a charitable understanding of the poor, their troubles, and their limitations,—a willingness to work overtime with no recognition of the fact from any one, a freedom from petty professional jealousy if others interested in humanity undertake similar work,—these are the principal characteristics required. Our training schools should add a course in social work to the nurse's training, in which the patients applying at the dispensaries should be handled in the same manner in which applicants for charity are handled by our modern charitable agencies. The applicant should first make a statement that he is unable to pay for service and immediately following the medical attention given him at the time of his first visit; the nurse acting as social visitor should pay a visit to the home and investigate the income of the family and the ability to pay for the necessities of life. In Philadelphia this course is already taken by the Society for Organizing Charity, the Children's Bureau, and the Phipps Institute before rent is paid or provisions and clothing furnished. When medical service reaches the value of a quart of milk, the same procedure will be followed by our general hospitals. In the mean time, however, the municipal service offers an ever-widening field for properly trained nurses, and to such as feel the call to labor hard among the poor of our large cities, a great opportunity is presented.

Closely allied to the work of the school nurse is that of the municipal nurse engaged in child-saving work during the hot summer months. The work in 1910 of the nurses under Director Neff and Dr. Newmayer may be mentioned. It should be remembered that this summer marked the beginning of the work of the Division of Child Hygiene and no mention is made here of the activities planned for the future.

Eighteen nurses under the immediate direction of Miss Perkins formed the corps, 8 of whom were paid by the city and 10 by volunteer organizations. Twelve of the nurses formed a central group for work

in the congested slum district and 6 others worked in the outlying districts. The 12 nurses of the central district were again subdivided into 2 groups, 1 group of 8 nurses to investigate cases, instruct parents, and report cases to the central office; the other group, numbering 4 nurses, to visit the sick babies and give them attention under direction of the attending physicians. In this manner 1463 sick infants were handled, of whom 396 were referred to hospital wards, dispensaries, or free country homes. A total of 4300 home visits to sick babies already reported to the central office was made.

The corps of nurses who carried on the mixed work of social investigation, instruction, and reporting of cases visited 6300 homes, making a total of 8300 visits.

In addition to home visiting, the Department of Health and Charities maintained 2 baby-saving stations on the Delaware River piers. Here 4 nurses were stationed. Fifteen hundred infants were brought to these piers for a total of 5000 visits. The caretakers or mothers were instructed individually by simple friendly talks and also by lectures given regularly morning and afternoon. One of the piers was open day and night, and sleeping accommodation furnished to several women and babies nightly. This accommodation involved the furnishing of breakfast for at least the mothers. The other pier was open from 8 in the morning to 11 at night.

Finally, for time does not permit further detailed description, instructive talks were given to 500 expectant mothers, free milk furnished to certain worthy cases after home investigations by the nurses had been made, and over 500 sanitary complaints concerning nuisances encountered were made to the Bureau of Health.

Municipal Specialists and Municipal Aid.

Each city should retain in its service a neurologist, a dermatologist, an ophthalmologist, and an orthopedist, the compensation of each depending upon the size of the school population and the professional demands made upon him.

The Neurologist.—This physician should be skilled not only in the subject of mental deficiency and nervous diseases, but he should have, as well, a broad medical knowledge of the diseases of children, and a further knowledge of social medicine.

Any large city will find a place for all of his time, although the number of hours given to the actual examination of children is limited because of the fatiguing character of this work.

His special province should be the examination of backward and feeble-minded school children, numbering about 1 per cent. and 1/10 per cent., respectively, of the whole school population.

Without going into the subject from a medical standpoint at this time, it should be noted that the proper aim of this specialist should be:—

1. The examination of those children whose mentality is doubtful—such children are numerous—and the advisement of the teacher as to medical, social, and educational measures.

By the latter is meant special classes for backward children, with their mental training, physical education, small classes insuring individual attention, and concrete object teaching. The neurologist need not instruct a good teacher concerning the mental peculiarities of each case. What the teacher needs is a knowledge of the home surroundings, heredity, and physical health of each child, with definite information as to which is at fault, and an expert opinion as to the existence of actual feeble mind.

2. The detection of all cases of feeble-mindedness in whom a positive diagnosis can be made. These cases call for permanent custodial care, and effort toward this end should be in every case a definite part of the work. Aside from the fact that the safe segregation of the feeble-minded is important from a social standpoint, it is evident that from an educational standpoint it is not less so. Since each child costs the school system about $35 a year, it can be seen that the transfer of 50 children to a proper custodial institution will pay the neurologist's salary for the year, and continue to do so for six or eight years, until the children's school life expires.

3. The examination of children suffering from nervous disorders. Such children, both those who are generally nervous and those suffering from such diseases as chorea and epilepsy, are quite numerous in our schools.

A general idea of the cases encountered by the neurologist when examining supposedly deficient children in the ordinary schools is given by the following list, comprising 200 consecutive cases examined by the writer in the spring of 1911:—

Mentally dull	71
Backward (*i.e.*, undetermined or borderline cases)	63
Backward emotive	2
Feeble-minded (high grade 41, imbeciles 14, idiots 0)	55
Miscellaneous (epileptic 1, defective speech 2, defective hearing 2)	5
Normal	4
Total	200

THE DERMATOLOGIST.—The dermatologist may serve in the municipality in a dual capacity, as an expert in the diagnosis of small-pox, scarlet fever, and other contagious diseases exhibiting skin rashes, and as a diagnostician in minor or doubtful skin affections. He should be at a stated place every day at a stated hour, so that medical inspectors may easily reach him by telephone, and be able to send children to him for examination.

Fig. 31.—Free eye clinic.

In Philadelphia, printed cards are furnished the medical inspectors, stating when and where to call, and directing that the children be taken at once for examination. The detection and recommendation in the case are free, and, although addressed to the medical inspector and first seen by him, may be taken to any private physician or hospital dispensary as an aid to treatment.

THE OPHTHALMOLOGIST.—The ophthalmologist in a great city with a large immigration population performs valuable work in the diagnosis of suspected cases of trachoma.

A large city may conduct a free eye clinic for children, in-

cluding the dispensing of eye-glasses. This is considered in the following section, on Free Eye-glasses.

THE ORTHOPEDIST.—The orthopedist should have special charge of those children who by reason of deformities require his skill. The majority of such cases are those of flat chest and stoop shoulders. A smaller number consist of lateral curvature, and a still smaller number of crippling paralyses. In the latter

Fig. 32.—School gymnasium for the correction of orthopedic defects. Lyons School, Philadelphia.

case, the most that can be done by a municipal physician is the prescribing of braces and shoes, with the advice to the parent, if such advice be proper, to seek a hospital dispensary or hospital ward for massage, electricity, or operation, as the case may be. If the municipal officer be himself in charge of a hospital, so much the better, since he can then facilitate the carrying out of his recommendations.

The correction of stoop shoulders, flat chest, and of lateral curvature may well occupy the major part of a specialist's time

Fig. 83.—School gymnasium for the correction of orthopedic defects. Lyons School, Philadelphia.

Fig. 84.—School gymnasium for the correction of orthopedic defects. Lyons School, Philadelphia.

in our large cities. All such cases of minor degree should be selected by the school principals and medical inspectors, treated medically for their causative defects, and then given corrective gymnastics in their own school buildings by physical instructors and teachers. The majority of cases do not require special apparatus; so the work is really easy of accomplishment.

In the case of pronounced flat chest, it is a good plan to have such children report to an orthopedic gymnasium in charge of the orthopedist, of which one or more may be maintained by the school system. Here these children are vigorously treated by more than routine measures. The apparatus need not be complex; wands, which may be sawed-off broomsticks, hanging rings, and a hanging ladder make up the principal apparatus. The children should report here two or three times a week. The orthopedic gymnasium fitted up at a trifling expense in the Lyons School in Philadelphia is shown on pages 92 and 93.

FREE DENTAL TREATMENT.—The fact that about one-half of all school children show decay in one or more teeth and, among the poor at least, the cost of dental service makes treatment impracticable under ordinary conditions has led to the establishment in an increasing number of cities of free dental dispensaries. A partial list of such cities includes New York, Boston, Brookline, Cleveland, Reading, Philadelphia, Indianapolis, Spokane, and Los Angeles.

In New York, dispensaries are maintained by both the Health Department and the Children's Aid Society. In Boston a gift of $2,000,000 has recently been made by Mr. Forsythe for an institute in which every child under 16 years of age who applies may receive free dental treatment.

The conduct of these dispensaries varies considerably. The majority of them provide free treatment to all school children who apply. Some, such as the Reading Dispensary, provide free treatment only for cases recommended by the Associated Charities of the city. In the case of the majority, some certificate is brought by the child from the teacher or school inspector.

Useful as this work is, it can easily be seen that it is but a drop in the bucket toward the correction of the dental defects of all children. For instance, last year one of the New York dental dispensaries reported that it had handled between 800

and 1000 children. Allowing that five times this many are treated free in New York at the present time, it can be seen that, with 800,000 school children of whom 400,000 need dental treatment, we are merely scratching the surface.

In Philadelphia[1] the dental dispensary at the City Hall is conducted by 200 volunteer dentists, each of whom gives three hours once in two months. This dispensary treats about 400 children a month, or 4000 children a year. The public and parochial schools together contain almost 250,000 children. It can be seen that 20 dispensaries like the above could be utilized in this city.

Fig. 35.—Dental dispensary for school children.
City Hall, Philadelphia.

[1] The dental corps in Philadelphia is a voluntary association of 200 members, working under the Department of Public Health and Charities, which has charge of all medical work in the schools. A committee of five members has immediate charge of the work. Two rooms in the City Hall are used for the dental dispensary, one of which, containing two chairs, is in use constantly, and the other, which is designed for extractions, is used occasionally, but particularly on Tuesday afternoons, when one of the dental surgeons with especial skill in nitrous oxide anesthesia is present. At the time of this writing the work has been in progress four months; the children have been sent to the dispensary by the medical inspectors of the schools, 10 or 12 children being treated every time by the volunteer dentists reporting for duty on that day. A man is in charge of the place, doing not only the work of a first-class janitor, but that of a file clerk also. The general policy of the dispensary is to save the teeth whenever possible, and particularly

to save the first permanent (six-year) molar tooth, whose presence in the mouth determines largely the regularity of the teeth subsequently appearing. During the three months previous to this writing, the report of the dispensary shows that about 400 children are treated every month, the treatment including over 300 fillings and about 200 extractions. Figures are given in the subsequent section, on the Results of Medical Inspection.

The complete plan of dispensary work, *which is as yet only projected*, includes visits to the schools themselves by the dental corps; examination of the mouths of the children and filling out of individual record cards bearing upon the condition of the teeth; the notification of parents; the investigation of the finances of parents applying for dispensary treatment; the complete record of the dental condition of all the children in the school, with the recommendations for treatment and the treatment secured; the report of the same to the central office; the clinical reports of the dental dispensary, and summaries of this clinical work.

As the exact procedure of the dispensary system (presuming it will be carried out as projected) may be interesting to school authorities considering the establishment of a similar dispensary, it is worth while mentioning in detail the one used in Philadelphia. It comprises:—

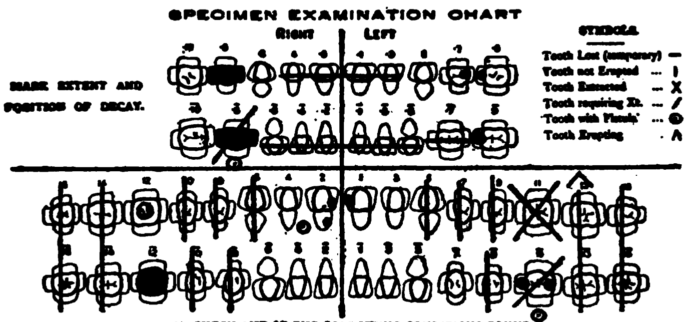
I.—Child's individual card record, which is termed the examination chart. This gives the year examined, the name, address, age, nationality, sex, color, school attended, with the grade standing. The clinical record is briefly made by the use of a diagram showing conventional teeth, each of which is shown in its anterior, posterior, mesial, or external aspects. These, with the six symbols which may be marked on them, make the description of the mouth condition an easy task. An example of this is shown in the chart below. It will be noticed that the conventional teeth shown upon the chart are also numbered, the tooth No. 1 signifying the left central incisor; tooth No. 10, the right second bicuspid, etc. A line over the tooth number signifies lower jaw. A decimal point before the tooth number signifies temporary tooth. Thus it can be seen that the record is not only brief, but quickly transferable in an intelligible manner. (See Fig. 36.)

II.—A record list of all children in the school, stating whether or not dental treatment is needed; the name of the dental inspector; whether or not the parent called upon the principal when requested to do so; whether the case was referred to a private dentist or to the city dispensary, and, finally, whether or not the treatment was secured.

III.—A weekly report from a particular school by a dental inspector, giving the date of the report; a daily record for the work, with total figures; the number of pupils examined; treatments recommended; parents notified; parents who responded to the request to call upon the principal; cases referred to private dentists; cases recommended to the dispensary; whether or not treatment was secured, and remarks.

IV.—The notice to parents, issued jointly by the inspector and the principal, stating that the child is in need of dental treatment, and asking the parent to call at the school and consult the principal.

V.—The certificate to the dental dispensary from the principal and the inspector, stating that the child has been found to need dental



(✓) CHECK ANY OF THE FOLLOWING CONDITIONS FOUND

STATE OF TEETH		TARTAR			No.	Hare Lip	
Clean		Little		Natural arrest of Caries		Cleft Palate	
Fair		Much		Fractured Tooth		Hard | | Soft	
Dirty		TOOTH BRUSH		Fistula	2	Mouth Breather	
Foul		Used		Fistula opening on Face		Much Caries | | Little Caries	
Stained		Not Used		Supernumerary	1	Enlarged Tonsils	
IRREGULAR		Has None		Hutchinsonian Teeth		Necrosis of Bone	
Upper				Honeycombed		Cicatricial Attachments	
Lower				Teeth Filled	1	Closure of Jaws	

SPECIAL INSTRUCTIONS

The Charts shall be marked in *Pencil*, in order to avoid the accidental marks from blots if marked in ink.

The essential points required shall be supplied by marking on the chart of the teeth the extent and position of the decay, the teeth lost, not erupted, extracted, or requiring extraction, and those accompanied by fistulas. Special care shall be taken that the number of teeth actually present is accurately shown on the chart, as otherwise errors may arise as to the frequency of the presence of temporary teeth in the adult.

Enter age of child examined, in years and months, on date of examination. If the age is doubtful, place an interrogation mark after the figure of the reputed age. Carefully ascertain the general information called for and note the following instructions for marking the examination chart.

TEMPORARY TEETH. (1) Shade in roughly on each tooth diagram the extent of the caries affecting each tooth. (See specimen case 7, 8, 9, etc.).

(2) Teeth lost should be indicated by a horizontal line drawn across the diagram thus :—(See specimen case ·2, ·4, ·1, .3, etc.).

PERMANENT TEETH. (1) Teeth not yet erupted should be indicated by a vertical line drawn through the diagram of such teeth, thus: | (See specimen case 6, 8, 10, etc.).

(2) Teeth which have been extracted should be indicated by a St. Andrew's cross, thus: X. (See specimen case 11).

(3) Teeth which should be extracted should be indicated by an oblique line, representing one limb of the cross, thus: / (See specimen case $\overline{11}$).

(4) Shade in roughly on each tooth diagram the caries affecting each tooth.

(5) Any fillings present may be indicated by a simple outline on the appropriate tooth diagram. (See specimen case 12).

(6) Note on the chart, over or under the appropriate tooth diagram, any existing fistulous opening, thus: ⊙ (See specimen cases $\overline{4}$ and $\overline{11}$).

Fig. 36.

treatment, and that the parents are unable to pay for the same. This certificate carries the office hours of the dispensary upon it.

VI.—An individual card record, which is termed the clinical chart. This card is filled out for the child upon his first visit to the dispensary and filed there. On one side is the diagram of the mouth mentioned in

connection with the examination chart. On the other is the record of the operations performed, their dates, and the names of the operators. This card measures 5 x 8 inches.

VII.—A monthly report of the dental dispensary, made out by the chief of the dispensary, and giving the figures for each day and the total for the month. These entries are a maximum of eighteen, namely: the number of patients, the number of fillings made (amalgam, gutta-percha, cement, copper cement), canals treated (dressed and filled), pulps treated (pulpitis capped, devitalized, and extracted), pericementitis, abscess, gingivitis, stomatitis, cleansing, extractions, miscellaneous.

VIII.—Another report of the dental dispensary, showing the names of the inspectors working during the month, this work including both examinations at the schools and dental treatment at the dispensary. This report sheet is indeterminate as to the time period, since it is a running list of inspectors, with the amount and character of his work beside each inspector's name. The other items are the number of schools assigned, visits made, pupils examined and treatments recommended, parents notified, parents calling upon the principal by request, children treated by private dentists, recommended to the dispensary, treated at the dispensary, and remarks.

IX.—There are also two bulletins of instruction issued to the dental corps. The first is for the purpose of standardizing the work, and is of a technical character. This bulletin, which is marked No. 1, may be procured from the dental dispensary by those interested. The second is a bulletin instructing the dental corps in the outline of the examination and the clinical charts which have been described.

Some one has well said that, if all the children were attended to, there would not be half enough dentists to do the work.

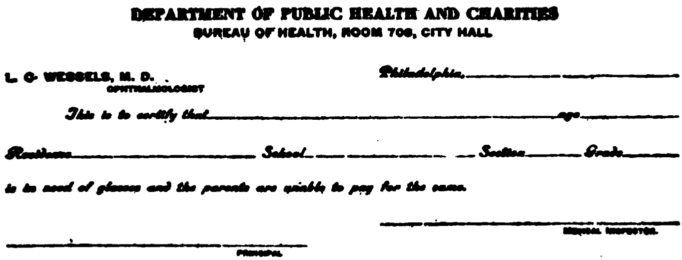
The expense to the community of a free dental clinic depends principally on the expense for professional service. In the majority of the dental dispensaries recently instituted for the benefit of school children, this service is voluntary, but underneath this voluntary service is no doubt the thought that public service should receive compensation, and that the latter will come after trial and approval. To maintain 20 dental dispensaries in Philadelphia, paying $5 to each dentist for every three-hour period of labor, would cost the city over $100,000 annually. New York could well spend three times that sum. In considering this matter, let us do it on a business basis. It is no more fair to expect professional men—especially those who do laborious, time-requiring work—to work for nothing than it

is to ask carpenters, contractors, and manufacturers to make similar donations.

The effect of free service upon the community is a social question discussed in connection with free meals for school children.

In addition to professional service it has been suggested that certain material aid be given poor children, particularly eye-glasses and nutritious food.

FREE EYE-GLASSES.—It has been already mentioned that the official ophthalmologist in Philadelphia prescribes glasses for the children of the very poor. The City also supplies free eye-



DEPARTMENT OF PUBLIC HEALTH AND CHARITIES
BUREAU OF HEALTH, ROOM 708, CITY HALL

L. C. WESSELS, M. D.
OPHTHALMOLOGIST

Philadelphia, ____________

This is to certify that ____________ age ______

Residence ____________ School ____________ Section ______ Grade ______

is in need of glasses and the parents are unable to pay for the same.

____
MEDICAL INSPECTOR.

____
PRINCIPAL.

Fig. 37.

glasses to these children. Several hundred pairs of glasses are annually given out. The optical firms bidding lowest for the contract during the four years' existence of this charity have supplied the glasses (lenses according to prescription, with steel frames) for about 85 cents. Several of the best firms in the city have submitted bids of $1 per pair.

The best method of procedure is a dual system in which free glasses are supplied to the poor, and glasses at a low price to those who are poor, but not exceedingly so. In Philadelphia several reputable firms upon private request have agreed to supply glasses, ground according to prescription, with aluminum frames[1] for $1 a pair to such children as present a request from

[1] Aluminum frames cost the optician but a few cents. Stock lenses bought wholesale are likewise very cheap, not more than 25 cents each. If, however, a cylinder is ground on the original stock sphere, the optician must do this himself, and the cost greatly increases. Most free-dispensary work on children is not overcarefully done. The rule of partial correction allows some leeway, and the existence of astigmatism is ignored unless it is quite marked in degree. Consequently, these dispensary prescriptions are very often for simple spherical lenses, which the optician handles cheaply in wholesale quantities.

school principals, medical inspectors, or school nurses. This price, taking prescriptions as they come, will yield the optician a very small profit. Thus the parent is saved from pauperization, and the optician mixes a good act with an advertisement of his place of business.

SCHOOL FEEDING.—The institution of school restaurants, including the practice of feeding the children of the poor at public expense, has been vigorously advocated during the last few years. In Europe the system is an old one. In support of school feeding in our large American cities statements have been made that thousands of poorly nourished children habitually suffer from hunger. On the other hand, it has been as positively said that these statements are gross exaggerations.

Since the school lunch, well conducted, is undoubtedly a great benefit to the children of the poorer classes, and, on the other hand, is a considerable expense item to the community, we may arrive at a clearer idea of its feasibility by considering:—

1. Its present popularity (status) in Europe and America.
2. A description both of the 3-cent noon meal and the recess penny lunch.
3. The beneficial results of school feeding.
4. The advisability of the 3-cent noon lunch and the penny recess lunch in American schools, including the free feeding of the poor.

School Lunches in Europe and America. *(Present Status.)*

In Europe the public feeding of school children, including the free feeding of those too poor to pay, has increased steadily from its inception fifty years ago. A very informative article in the *Journal of Home Economics,* April, 1910, by Louise Stevens Bryant, gives an account of the work in England, France, Italy, and Germany. Details are unfortunately not given, except in connection with the well-known Bradford, England, experiment.

Briefly reviewing this article:—

The general rule is to sell lunches at cost, with free feeding of poor children unable to pay. The homes of the latter are investigated.

Absolute poverty is apparently much more widespread in Europe

than in America, particularly in England, where it is so prevalent that the poorly fed child constitutes a real problem.

In England, France, and Italy the midday lunch is the one provided, with sometimes extra light lunches during the school sessions. The inclusion of these latter, by the way, confuses the meaning of the statistics in some instances. In Germany the school meal is usually a breakfast.

England alone has a formal law concerning school meals. This is the Meals Act, passed in 1906, during the excitement caused by the rejection of two-fifths of the volunteers for the Boer War because of physical unfitness, and by the reports of two important investigating commissions. The Act is permissive and entails no local obligation. Just before the passage of the Act school feeding was practised to some extent in 146 cities and towns. In 1909 about 134 of the 327 English school districts were practising, to some extent at least, the public feeding of school children. In London 5000 persons serve on the Children's Committees, and the London County Council expended $311,000 in 1909. Forty-seven thousand children applied for *free* meals—over 7,000,000 *free* meals. The city of Bradford, England, has attracted much attention by reason of its plan of school feeding. Here both breakfasts and penny lunches are supplied. An erroneous general impression should be corrected as to the proportion of school children and also the proportion of paying children who eat these meals. The school population of Bradford is 47,000, the diners average 700 daily, and of these only 200 pay. Some of these pay only partially. The plan was inaugurated to relieve widespread actual distress which existed in England, particularly about the year 1906, and which has found no parallel in America, except temporarily in our eastern cities during the financial panic of 1907.

In France the school meal is in use throughout the country, although in the smaller towns and villages it appears to be a bring-your-basket picnic participated in by simple-minded folk. In the larger towns school restaurants are the rule, although this does not signify that all of the schools are so equipped. Paris is the only great city of the world which makes adequate provision for the proper nourishment of all its school children, and it has done so since 1881. In the year 1909 the municipal expense was $210,000. Meals are sold or given as the financial condition of the children dictates. Free cases are investigated. The free ticket looks so much like the purchased ticket that the children cannot distinguish them. Children may bring their lunches from home and eat them with the other children. In 1908 there were 353 restaurants, supplying 38,531 children in 588 schools, an average of 190 children to each restaurant and 66 to each school. [Since the Paris population in 1906 was 2,763,000, giving probably a school population of 340,000, the proportion of the children who took the school lunches would appear to be 1 in 10. How many times these children took the lunch I do not know. Some figures on *Italian* children indicate that an average child taking the school lunch does so about one-third of the

year's school sessions. Eight million meals are recorded, but, as a light lunch is sold at both morning and afternoon recesses in many of the schools, it is evident that these probably comprised at least two-thirds of the total number mentioned. Two million noon lunches would signify 50 lunches each for the 38,000 children patronizing them.—W. S. C.]

Germany has school feeding in nearly one-half of the cities of 10,000 or over. Two-fifths of these cities depend entirely upon charitable private enterprise, which indicates, of course, only a limited field. Six to 7 per cent. of the school children use the free breakfast. The regularity of their patronage and the number of charity cases are not stated. As to the price of the breakfast, Stuttgart furnishes a roll and a cup of warm milk for 1.3 cents (6 coupons for 8 cents).

Italy has 50 towns practising school feeding, in half of which it is municipal. The school meals are very popular. In Rome 50 per cent. of the children take the meals, and only 5 per cent. of these (2½ per cent. of all) take the *free* meals. In some towns 75 per cent. of the children take the school lunch. [Statements like these do not mean much without additional data.—W. S. C.]

Switzerland, in 1894, reported that about 7 per cent. of the entire school population used the school lunch. The partakers numbered about 35,000. Eleven thousand schools operated the lunch system, and in these schools the proportion of participating children was about 25 per cent. [These figures appear inaccurate, since the population of Switzerland is only 3,500,000. If Switzerland has 44,000 schools, they must have a school population of about 10 children each.—W. S. C.]

The United States has done but little so far in the direction of school feeding, but at the present time there is a great expansion along this line. About 30 different cities and towns have some movement actually under way; most in the last two years (since 1909). In New York City several school restaurants, in which, also, the poor children are supplied free, are under the supervision of Miss Mabel Kittredge. In Philadelphia a recess penny lunch is sold in 7 schools in the foreign quarter, a 3-cent noon lunch at the Agnew School, both at the Wood School, and formerly a 3-cent lunch (later described) at the Burk School. These are under the supervision of Miss Alice Boughton. In Boston 12 schools have provision for feeding the children.

The Three-cent Meal and the Penny Lunch.

(*Food Value, Community Expense.*)

(a) *The Three-cent Meal.*

The 3-cent school meal, which is furnished at cost after careful buying and scientific preparation, offers the child more than a third daily ration, and also more nourishment for the money than can be obtained at home. It may be added that the children are educated to better cooking standards and to better table manners. The expense of handling is small, provided a sufficient number of schools adopt the system to make the supervision expense fractional. A woman employed can prepare the food during the morning hours, and a dozen or twenty of the older girls can help serve it. The latter are compensated by complimentary meals.

Miss Boughton, who has charge of two 3-cent meal experiments and six penny lunches in Philadelphia, gives me the following menus, which can be supplied at a cost of 3 cents each:—

THREE-CENT DINNERS—MENUS.

		Food value. Conservative estimate expressed in calories
1.	Cocoa. Apple Butter. Sandwich. 2 Dates. 1 Graham Wafer.	439
2.	Rice Pudding with Raisins. Bread. 1 Pretzel. 4 Stewed Prunes.	400
3.	Bean Soup. Bread. 1 Milk Lunch. 2 Stewed Peaches.	485
4.	Corn Chowder. Bread. 1 Graham Wafer. 1 Banana.	400
5.	Baked Beans. Bread. 1 Pretzel. 5 Stewed Prunes.	425
6.	Macaroni with Tomato Sauce, or Macaroni with Hamburg Steak and Brown Bread. Milk Lunch. Gravy. Small Orange.	410

In Bradford, England, the dietetic plan formulated by Dr. Crowley aims to insure a 10-year-old child 1900 calories each day in fuel value, with a basis therein of 68 grams of proteid. The school breakfast and lunch together furnish 1500 of the 1900 calories. The breakfasts cost 2½ cents and consist of oatmeal, milk, bread and butter *or* molasses. The lunches [dinners] cost 3 cents each and are of 17 different kinds. "Of the 17 dinners, 4 were made up of substantial soups and boiled or baked jam or ginger puddings and wholemeal cakes. There

Fig. 38.—School lunch—New York City. (Courtesy of Underwood and Underwood.)

were 6 dinners with meat and vegetable pie, stew, *et cetera.* One dinner was especially elaborate with fish and potato pie, green peas and lemon sauce, blanc mange and jam. Bread was served with all the meals, and milk, the most valuable source of proteid for children, was used in nearly all. These menus . . . are in permanent use in Bradford." [The prices quoted for these breakfasts and dinners are not possible in America. —W. S. C.]

In the year 1908-1909, the total cost was $22,000 for an average of 700 dinners daily. The average total cost of a meal was 3¾ cents, of which the food cost 2⅕ cents, and the administration 1⅗ cents. Three-fourths of the meals were dinners and one-fourth were breakfasts.

At a cost of $22,000 "10,000 meals can be prepared. This includes the installation of new bakers' ovens in which the city can bake its own bread. These are heated by steam from the same boiler house that provides heat for one of the schools and warm water for one of the public baths. . . . The food is prepared in a large central kitchen and is placed in large heat-retaining vessels and carried by motor cars to the 20 school dining rooms in the different districts. The kitchen is fitted with the most modern equipment. . . . The dining halls are so furnished that the entire effect shall be educative. They

Fig. 39.—School lunch, Philadelphia.

are painted and furnished in light colors; the tables are covered with white tablecloths. . . . They [the halls] accommodate about 125 children each. Teachers [1 to every 50 children] volunteer to supervise the meals." [It is my impression that they are paid 25 cents each daily.—W. S. C.] "The waitresses are the older school girls."

(b) *The Recess Penny Lunch.*

This supplies the children with really nutritious food in appreciable amount at very small cost. It also diverts their pocket pennies from the dealers in cheap candies, which are indigestible, taste-perverting, appetite-destroying, and tooth-decaying. The only administrative expense is that of a woman employé who gives about two hours to the preparation of the lunch, twenty

minutes to the sale of lunches at recess, and twenty minutes to dish-washing. Such a system should be installed in every school. Miss Boughton gives a concise account of the food furnished in 6 Philadelphia schools at recess time in the *Psychological Clinic* for January 15, 1909.

To meet what was known to be the need of these children for wholesome food, prepared and served within the means of the poorest, the Starr Centre Association fifteen years ago started the penny luncheon, which was reorganized on its present

Fig. 40.—Penny lunch, Philadelphia.

basis two years ago. The unit is 1 cent, and the food which is served to the children at their regular recess costs just what they give for it, the cost of equipment and running expenses being met by the Starr Centre.

To keep up the children's interest the menu is varied slightly from day to day. The articles served are:—

One cup of cocoa (1 cup equals $\frac{1}{6}$ of a quart), 1 cent;
One cup of strawberry tapioca, 1 cent;
One cup of rice pudding, 1 cent;
One cup of bean soup, 1 cent;
One cup of creamed hominy, 1 cent;
One-half shredded wheat biscuit with stewed fruit, 1 cent;

Three pretzels, 1 cent;
Four graham wafers, 1 cent;
One tea bun, 1 cent;
One coffee cake, 1 cent;
One banana, apple, orange, peach, grapes, pear, etc., 1 cent;
Five large boiled Spanish chestnuts, 1 cent;
Stewed dried and fresh fruits in season.

The food value of all the recipes has been calculated for caloric value by the students of the normal domestic science course at the Drexel Institute.[1] In every case, with the possible exception of the fruit, the heat value is as great or greater than that of an egg. To obtain these results the recipes are not only carefully worked out, but also from week to week their preparation is supervised in order that the standard may be maintained.

	Ingredients	Protein, Grms.	Fat, Grms.	Carbohydrate, Grms.	Calories	Calories per Portion	Cost	No. Served
Cocoa No. 1	¾ c. cocoa, 3 qts. milk, ¾ c. sugar, 1 qt. water	108.12	133.41	338.24	2978	124	.2478	24
Cocoa No. 2	1 c. cocoa, 2⅓ qts. milk, 1 c. sugar, 1⅓ qts. water	99.29	123.47	326.25	2892	116		24
Rice pudding	⅓ c. rice, 1 qt. milk, ⅓ c. sugar, water, salt	37.95	36.57	237.15	1478	164		12
Bean soup	1 qt. beans, 5⅓ oz. salt pork, water, seasonings	178.54	114.71	489.32	3492	194	.13	18
Bean soup without meat	1 qt. beans, salt, pepper, water, pot-herb, celery	165.84	13.26	439.32	2538	141	.09	18
Meat sandwiches		172.35	94.14	497.68	3304	143	.2318	23
Milk	½ qt., = ⅓ of ½ pt. cup						.01	
Pretzels, 3		3.35	1.42	26.64		133	.01	
Cream lunch biscuits, 3		4.15	5.18	29.85		182	.01	
Graham wafers, 4		3.54	3.35	26.14		148	.01	
Apricots by weight	25.05 grms.	1.15	.245	15.31		68		
Peaches " "	52.25 grms.	2.45	.52	32.65		145		
Prunes " "	45.25 grms.	.81		28.14		116		
Shredded wheat biscuit, 1		3.69	.49	27.42		128		

[1] The values were calculated from the analyses given in U. S. Agricultural Bulletin, No. 1287, American Foods—and are as accurate as I know how to get them without actually analyzing quantities of our food. They serve the purpose of getting at the comparative value of the different articles.

Beneficial Results of School Feeding on the Health of School Children.

Even though the below-average physical condition of the children of the poor may be attributed to other causes than poor food, such as lack of fresh air, decayed teeth, adenoids, *et cetera*, it is sensible to agree that good food is necessary for good health and should be provided by public agency *if it cannot be obtained at home.*

Two methods of ascertaining whether or not school feeding benefits the health of children are available. The absolute one, of course, is to try it. The other is to investigate the children's homes carefully and ascertain whether or not the children are given good food. The latter method has been tried by sociologists in New York City with such conflicting reports that the latter are almost valueless. The former fortunately has been demonstrated by the school authorities of Bradford, England. While the series is small, and the children so poorly fed at home that the experiment offers but little to the average American community (the report states that "11 per cent. of the children were poorly nourished . . . they had seldom tasted milk . . . only 1 child, a Scotch one, had ever eaten oatmeal . . . these children were quite unused to normal food"), it is the only completed experiment up to the present time, and is well worth noting.

Briefly, the report states that 40 children were fed from April 17th to July 24th, breakfast and dinner, as already described, containing together about three-fourths of a day's ration, and were weighed once a week. Records were kept of 69 "control" children also.

Under this systematic feeding the children gained over a pound and a half on the others during the first month and maintained this advantage (with a few ounces extra gain) until the discontinuance of the experiment in July. Both a temporary and the final discontinuance of the school feeding rapidly brought down the weight of the school-fed children toward the level of the others. This all appears to be reasonable. Since the children were weighed weekly, we can dismiss the idea of establishing a fictitious gain in weight by a stuffing process on the

last day. It should be remembered, however, that the Bradford meals would cost probably 5 cents each in America.

The following interesting chart shows the almost 2 pounds superior weight of the fed children at the end of the experiment. Those interested in the subject will note that a school boy gains about 5 pounds per year until 12 years, and then 10 pounds per year until 15 years of age:—

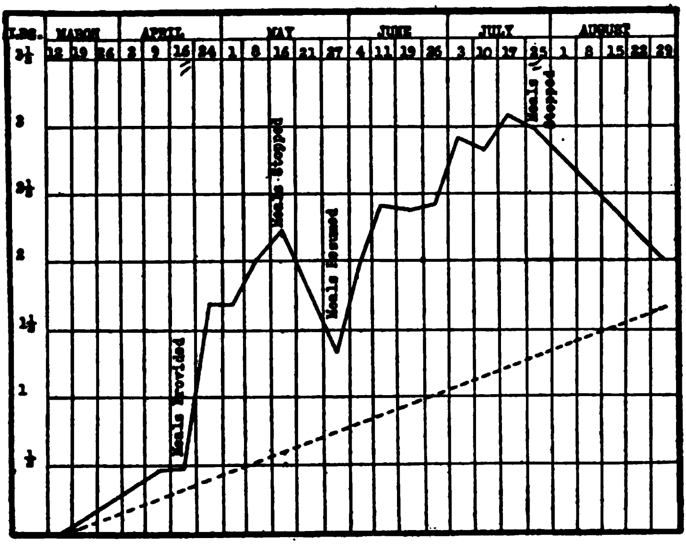


Fig. 41.—Diagram showing average individual increase in weight of children in Bradford school-feeding experiment during 25 weeks. Solid line shows average increases and decreases of children receiving meals. Dotted line shows average increase of control children not receiving meals.

In Philadelphia the League of Home and School Associations is trying a similar experiment to the one of Bradford. Whether it will furnish useful information is unknown in its present early stage.

The Advisability of the Three-cent Lunch and the Penny Recess Lunch in American Schools.

Advisability of the Recess Penny Lunch.—In the American city school, the "candy man" at the gate and the candy store next door bear witness to the number of loose pennies brought to school by the children. For this reason the recess penny lunch is sure of patronage, *providing* the vendor of the purple, green, and black stuff is expelled from the school premises. The penny lunch is inexpensive, since the janitor's wife or some neighborhood woman will gladly sell the milk, crackers, *et cetera*, for a small wage.

Miss Boughton, has given me the statistics on the degree of success attained by the recess penny lunches served in Philadelphia in 5 schools:—

School.	Social Characteristics of Population.	Age of Children.	Proportion Buying.
Agnew.	Petty tradespeople. Some are from the Tenderloin. All are poor, but of the improvident type. Plenty of loose pennies. Children accustomed to cakes and coffee.	Kindergarten grades.	18/32, or 56 per cent. 60/350, or 17 per cent.
Wood.	About the poorest native whites in Philadelphia. Children will eat anything, even crumbs. No money. Home ignorance, alcoholism also.	Kindergarten and grades.	108/400, or 27 per cent.
Adams Annex.	A special school for mentally deficient children. Better class than the Wood, but worse than the Agnew.	Kindergarten and grades.	56/137, or 40 per cent.
Washington.	Poor Italians, but loose pennies fairly plentiful. Have had to be taught to like wholesome American food, particularly cooked food.	Kindergarten and grades.	228/865, or 26 per cent.
Durham.	Mostly (four-fifths) colored. Poor, but of a rather good class.	Kindergarten and grades.	500/1000, or 50 per cent.

Note.—Of the total kindergartners, 90 per cent. of those *present* patronize the penny recess lunch—a number slightly fewer the latter part of the week.

The Advisability of a Noon Lunch.—The establishment of a noon lunch means a radical change in our educational and social theories. It carries the influence of the school into the home—whether for better or worse is disputed.

On the one hand, it is urged that the growing child should be insured good food; that the State is justified in spending money which will make healthy citizens; that good food, good cooking, and good table manners at school will produce corresponding improvements at home; that poor nutrition in some degree is the rule among the children of the slums, even when absolute destitution does not exist; and that it is justifiable to consider the hungry child apart from his family's needs, in order to give him quick relief.

On the other hand, it is stated that the expense of general municipal feeding would be enormous; that nine-tenths of it is unnecessary; that much of it would be refused; that the chief fault is bad cooking rather than lack of food; that the school-fed children would become discontented and contemptuous of their home surroundings, and that a poor child really signifies an entire poor family who should be helped privately by the Organized Charities. (The Organized Charities in most of our great cities, including New York, state their ability to care for all worthy cases.)

Let us consider the merits of the four principal systems of school feeding which have been advocated:—

1. General free feeding is so socialistic that the plan may at once be put aside for this reason alone. The American public school contains many children of the well-to-do, and therefore all social classes are represented. The expense in the city of New York would, for 900,000 school children for 200 days at 4 cents daily, equal $7,000,000. Probably the enterprise under public auspices would cost more than this amount.

2. Neighborhood restaurants for the free feeding of poor children would not be patronized because of the self-respect of parents. Like the soup houses of panic times, they are an evidence of widespread destitution seldom seen anywhere in America.

3. School restaurants selling meals at cost, but with no provision for charity, are worthy private benefactions, but they

miss the very poorest children (the most important class), and get but mediocre support from those able to pay. Under private auspices they are maintained at small administrative expense, and in needy neighborhoods only, because the willingness of the salaried officer to help the whole world is restrained by the limitation of the benefactor's purse.

Apropos of the number of children who are willing to *buy* the school lunch, the article by Louise Stevens Bryant, already mentioned, states that the proportion is small in European countries, with the exception of Italy and rural France. In the case of the latter countries no actual supporting figures are given. In Bradford, England, less than 200, out of a school population of 47,000, buy the food. The other 500 diners are on the free list.

In Philadelphia the noon lunch to be paid for at cost has been tried in three public schools, in one of which it has already died owing to lack of support. This case, however, is somewhat exceptional, since the children, who were Russian Jews, declined to eat from religious reasons as well as poverty (the religious reasons were unfounded, as every attempt was made to advertise that what little meat would be used would be kosher). It was noted, however, that the patrons were the wealthier ones. The other two schools are in poor American neighborhoods, and here the experiment has been tried only for two months. The writer knows that Miss Boughton, who is conducting the experiment, feels that the worst-nourished cases are not receiving the food, and is hoping for their pecuniary assistance from some philanthropic person.

The report on restaurant patronage (3-cent meals at noon) is as follows:—

School.	Social Character of Population.	Age of Children.	Proportion Buying.
Agnew.	See penny lunch.	Primary grades.	66/350, or 18 per cent.
Wood.	See penny lunch.	Primary grades.	30/340, or 9 per cent.
Burk.	Russian-Jewish. Poor, but not so poor as in two other schools nearby. Abandoned because of poor patronage.	Primary grades.	40/700, or 6 per cent.

In New York City the Public Education Association, through its School Lunch Committee, of which Miss Mabel Kittredge is chairman, maintains 3-cent lunches in several schools. Meals are sold, not given away, although poor children may be fed at the expense of some philanthropic person or society. A penny table is also maintained, but a child may not buy cocoa, or fruit, or a sandwich from it unless he has first purchased the 3-cent lunch. In this way the Association has endeavored to popularize the more substantial, principal meal. They feel that this method has been quite successful. The undertaking is financed by the Association, private contributions making up the annual deficit. The active interest of the school principals and tactful catering to national and racial relishes are stated to be important factors in the work. As to the popularity of the venture:—

"In School 21 the proportion is about 10 per cent. who take the luncheon. In School 107 the proportion is 25 per cent. of the school population. In School 51 and in School 33 we are, at present, feeding only the special anemic children. The expense of this special work is carried by the Tuberculosis Committee of the Charity Organization Society."

4. The school restaurant which includes free provision for the very poor is evidently the only practical system of reaching the children, since we have seen that the majority of the diners, and the hungriest ones, are the charity cases. This also limits the scope of the work to the poor neighborhoods, and makes the number of charity cases at hand the criterion of the restaurant's reason for existence.

If one goes out hunting for the number of poorly nourished cases in a slum public school, he will find, according to several writers, about 11 per cent. of the children to be in this condition. Suppose he reduces this to 5 per cent. by taking only the worst cases. He will find that a professional social investigation will produce a report in which only a small proportion of these are marked as cases of family destitution. My mind goes back to an investigation of the poorly nourished children in the Adams Annex School (see preceding table in connection with penny lunches) who were also destitute; the writer found 22 cases of very poor nutrition, but Miss Cutler, the school nurse,

reported that all but 5 (possibly 3) could afford to pay for a 3-cent noon meal. Similarly, in the year 1908, when the New York school teachers, by invitation, sent in a list of ill-nourished children, the Organized Charities promptly reported that the majority of these were being helped already.

However, if it is proposed to help the children of the poor by furnishing good food free if necessary, there should be no quibbling and hairsplitting on the financial account. The first aim should be to help the poorly nourished child. The second should be to ascertain if poverty exists.

Unfortunately, we are not able to present figures on free feeding of school children in America. Probably in the near future several reports will be forthcoming.

The following references will be interesting to those investigating the subject of school feeding:—

"The Free Feeding of School Children," Lancet Reports, 2d ed. Lancet office, 433 Strand, London, W. C. Price, 3d.

Three Reports of the Bradford Education Committee: "Return as to the Pecuniary Circumstances of 966 Families whose Children have been Provided with Meals," 1908; "Bradford Education Committee's Report for 1909"; "Recipes used, etc., by Marian E. Cuff," 1908. The Bradford Education Committee Office, Manor Row, Bradford, Eng.

"After Bread, Education," Fabian Tract 120. The Fabian Society, London. Price, 15d.

All the above can be obtained from Wyman & Sons, Fetter Lane, London, E. C., Eng.

"Die Emahrungsverhaltnisse der Volkschul Kinder," by Dr. Kaup. Carl Hymann's Sons, Berlin, p. 170.

"Food Values: Practical Methods in Diet Calculations," Bulletin of the American School of Home Economics, March, 1909; series i, No. 13; 606 W. Sixty-ninth Street, Chicago, Ill.

"The Penny Recess Lunch in the Philadelphia Schools," by Alice M. Boughton, Psychological Clinic, January 15, 1909.

"School Feeding in Europe," by Louise Stevens Bryant, Journal of Home Economics, April, 1910. Roland Park Branch, Baltimore, Md. Price, 40 cents.

The last writer is now preparing an extensive work on the subject, to be published by the Russell Sage Foundation.

The Open-air School.

Many inventions and discoveries are made almost simultaneously by several men, being the resultant of forces working simultaneously in the minds of many. Others are really combinations rather than creations. The open-air school is an example of both. With the increasing attention given to health matters by educators and sociologists, the medical inspection of children, the construction of numerous open-air sanatoria for consumptives, and the adoption of the modern doctrine that every child shall have an education, the fresh-air sanatorium school is a natural evolution. It marks an important milestone on the road to hygienic school conditions, however, for these schools are doing more to get the regular school windows open than years of advice and admonition; and through these open-air schools, sickly children, heretofore neglected, have been brought to health.

At the time of this writing, the fresh-air school being very recently, but extensively described in our popular magazines, the public is fast being converted to the belief in fresh air, but there is a confused idea that this fresh air can be obtained only by action of the school board, the employment of an architect and a contractor, extra teachers, a nurse, a cook, a grocer, and a milkman.

Let us realize that the "open-air school" and *fresh air in the ordinary school room* are two different things, although both are expressions of one basic idea.

The fresh-air school is really a sanatorium. It provides not only free air, but also nourishing food, enforced rest, warm clothing, individual teaching, sympathetic care, and medical attention which corrects eye-strain, adenoids, decayed teeth, and anemia. Naturally the health benefits of the open-air schools are due to other causes as well as the fresh air.

There is but one reason against the very extensive adoption of the open-air school—its expense. The cost per capita (about $140 per annum) is four or five times that of the per capita cost in the regular school. The *Survey* (March, 1911) states that Boston has closed its open-air school because of lack of funds. Even though the money cost may act at times as a

deterrent influence, the discussion alone of the subject must bring out the fact that the fresh-air constituent can be obtained for nothing, and that fresh air does not harm children, but does them good.

The first open-air school (note that these so-called schools are really single classes) was established in Charlottenburg, a suburb of Berlin, in 1904. Then the movement spread to other German cities, to London (1907), and to Providence, Rhode

Fig. 42.—Fresh-air school, New York City. Disused ferry-boat, Southfield. (From photograph by Brown Bros. Courtesy of Bellevue and Allied Hospitals, New York City.)

Island (1908). Since then, in America, open-air schools have been established in Boston, New York (5), Chicago, Hartford, Rochester, Montclair, Orange, Washington (2), Albany, Milwaukee, and Buffalo.

The methods of construction have varied greatly, although so far there has been a utilization of old buildings, roofs, and tents rather than the construction of specially designed buildings. In Providence the side of an abandoned school house was torn out to make a fresh-air class room. Boston adapted a deserted refectory building facing a park, putting the class

room on the roof, and altering the interior for kitchen, clothes room, *et cetera.* Boston, be it noted, has taken the first step toward better ventilation generally, by providing 1 open-air room in each school house. New York City has 3 condemned ferry-boats moored permanently to wharves, for the accommodation of actively tuberculous children; a roof school at the Vanderbilt Clinic for the same class of cases, and a remodeled class room, plus a roof platform, in one of the large regular schools, for

Fig. 43.—Open air—open minds. (Courtesy of Elizabeth McCormick Open-air School, Chicago. From "Open-air Crusaders.")

the care of poorly nourished children. Montclair uses a tent. Chicago has 4 schools, 2 of which are classes conducted in tents by the Tuberculosis Institute, 1 is an open-windowed, unheated school room, and 1 is the Elizabeth McCormick Open-air School, an asbestos board tent on the roof of a well-known day nursery (practically the same benefaction), which provides all house accommodations.

In a booklet describing the successful work of the Elizabeth McCormick Open-air School, published by the United Charities of Chicago, Mr. Sherman Kingsley writes:—

"The day nursery on the roof of which the school was held presented peculiar advantages as a laboratory for carrying on such an experiment. The equipment of the building, which included shower-bath and dispensary on the first floor, dining room and kitchen on the third floor, store room and tent on the roof, toilet rooms on the first floor and roof, and elevator service, was given freely to the use of the school children.

"The roof, illustrated on the following page, is completely inclosed by a high framework covered by wire netting. Against this netting young evergreen trees replaced during the winter the vines which covered the meshes in the summer months. The trees not only served the extremely practical purpose of a good windbreak, but lent a perpetual air of Christmas festivity to the place, which was reflected in the joyous faces and merry spirits of the children. When Christmas Day really came, the little trees were literally used for the purpose for which Nature had so evidently created them, and stood about the roof bedecked with the simple gifts which the children had made for themselves and for the teacher, and covered with the glittering crystals of the snow. Germany took her sick children to the pine forests to school; Boston put her little patients into class rooms on the roof; it remained for Chicago to bring the trees to the children and give her pupils a forest school on a city roof.

"Completely encircling the tent which stood among the trees were windows which swung out, canopy fashion, making an open zone clear around the tent. These windows could be dropped on the side from which a storm might come.

"The teacher, the supervisor of the school work, as well as the desks, blackboards, and all equipment, were provided by the Board of Education. No heat whatever was furnished in the tent, but heated soapstones were placed at the feet in extremely cold weather. No one seemed to have difficulty at any time in handling pen or pencil, although the thermometer often went below zero.

"Outside of the inclosed tent was a large shelter tent, which consisted simply of a canvas top, without sides, to protect from rain or extreme heat. Here the children took their daily naps, tied up snugly in their warm sleeping-bags and stretched out full length on canvas cots. The younger children and those who were least well often spent the entire afternoon in rest, and no one was urged to come into the tent to school if the teacher was convinced that the sleep would do him more good. Though the physical development was thus apparently put ahead of the mental growth, a glance at the record of advancement made by the pupils shows clearly that the mind was very far from suffering by such treatment.

"At the other end of the shelter tent stood a long table, on which the hot lunch was served at nine and three-thirty. A small store room on the roof gave space for the dish cupboard and gas stove, where the

lunches could easily be prepared by the cook. On the other side of the store room were lockers for wraps and supplies.

"Store room, toilet, and asbestos tent were already on the roof; the shelter tent was the only addition to be made for the school. The Elizabeth McCormick Memorial Fund, which provided for the expenses of conducting the school, also financed the Infant Welfare Work, for which these buildings on the roof had been previously erected.

"With this equipment the school was carried on from October to June. In June pupils and teacher went for one month to Camp Algon-

Fig. 44.—Complete relaxation possible on the cots. (From "Open-air Crusaders," by Sherman C. Kingsley. Copyright United Charities of Chicago.)

quin, the summer camp maintained by the United Charities, where the women and children of the poorer districts of the city are given two-week outings. The beautiful grounds on the bank of the Fox River, the roomy cottages, the immaculate cleanliness of dormitory and dining hall, the joys of campfire, baseball, swimming-pool, oaks, and brook impressed more deeply upon the minds of the children the high standards of personal conduct and pleasant home life which it had been one special aim of the roof school to inculcate. The changes also afforded opportunity to regulate absolutely all the conditions affecting the pupils in a way quite impossible in the city, where they must return at night to homes which, in spite of the most conscientious efforts of the visiting nurses, sometimes undid, in large measure, the good received during the day."

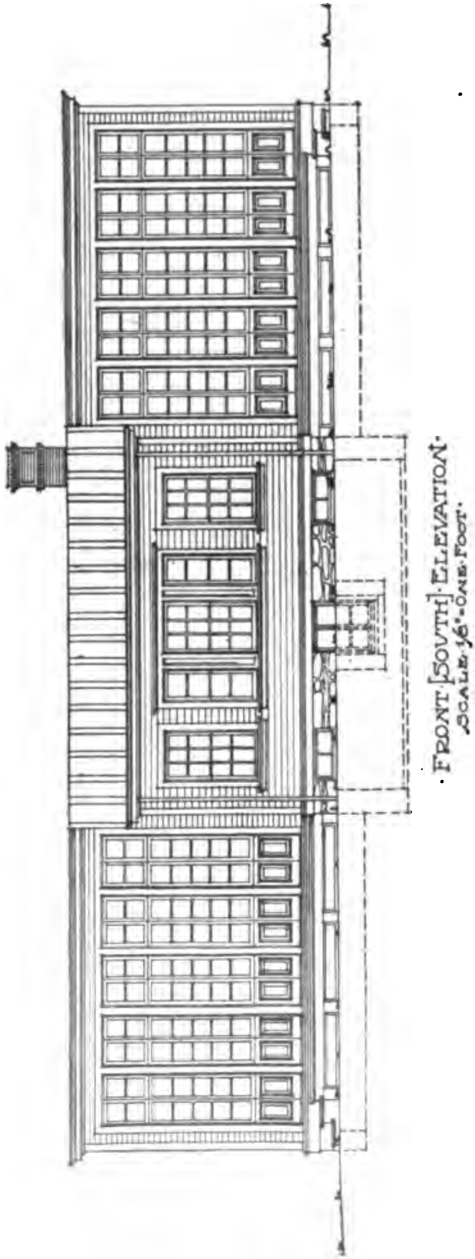
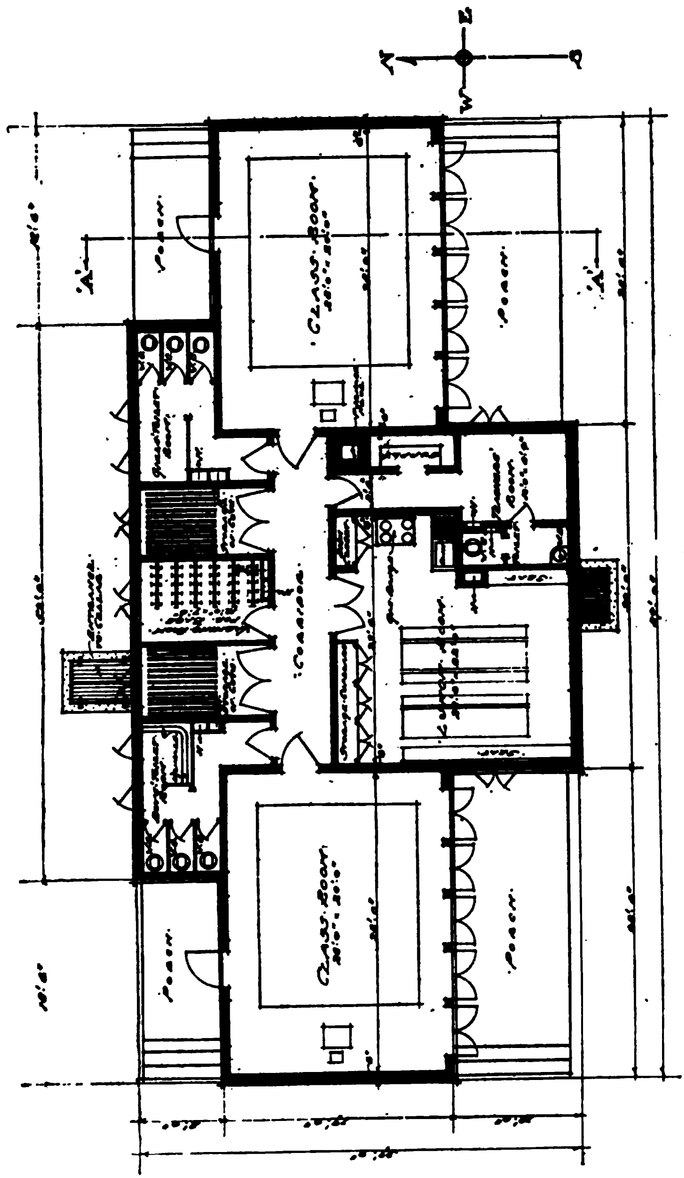
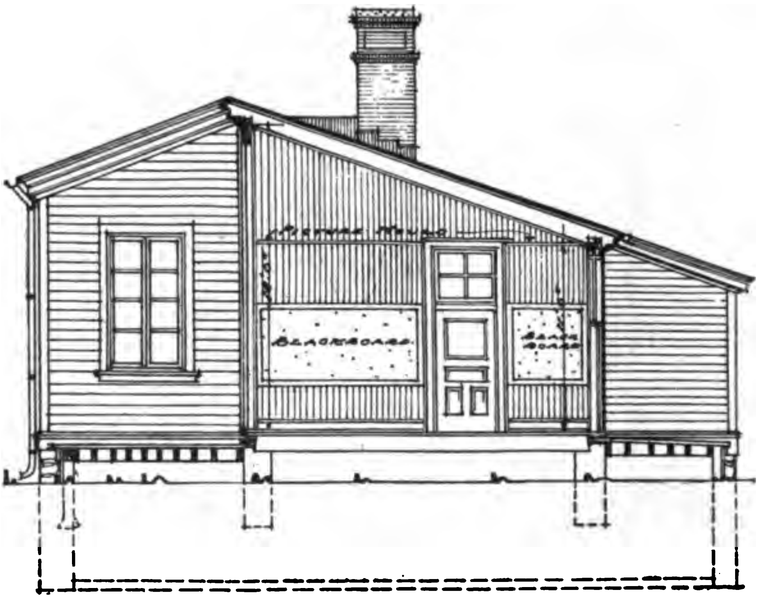


Fig. 45.—Plans for open-air school, Philadelphia, by W. A. Stecher, Director of Physical Education, and J. Horace Cook, Superintendent of Buildings.



PLAN.
SCALE 1/8" = ONE FOOT.
Fig. 45a.

The Board of Education of Philadelphia, at the time of this writing, is opening an open-air school on the roof of the McCall School, a handsome new building in a crowded part of the city. It will have the co-operation of the Phipps Institute, a social and medical agency for the treatment of tuberculosis operated by the University of Pennsylvania. The children



SECTION·ON·LINE·'A-A'·
SCALE·1/8"=ONE·FOOT·

Fig. 45*b*.

treated will be tuberculous cases; the Institute will furnish all supplies; the School Board, the roof space and the class teacher. A fresh-air class, the first of its kind in the city, will be formed in the Jackson School, in the Italian section. The latter will use an "open-window room," will be composed of poorly nourished children, and in the natural course of events will receive some simple nutritious food. Special plans for an open-air school have been drawn. In a large city the number of actively tubercular cases too weak (and sometimes too dangerous) to attend

the public schools demands such a school. The plans call for a building costing $7000 frame construction, or $15,000 brick construction. They are shown in the accompanying illustrations.

The building is designed to accommodate 50 children, 25 in each one of the two open-air class rooms. These rooms measure 20 x 28 feet, each having in front a large porch 12 x 28, and a small porch 8 x 18 feet.

The rooms are connected with the large porch by means of windows extending from bottom to top, which swing outward, thereby making the class rooms and porch one space with same floor.

The center of the building is occupied by a "warm" room, which is divided into a number of subdivisions, the first, a large room, being the lunch room, 23 x 32, with gas range, 2 tables, dish closet, and cupboard. Then come 2 storage rooms for storing the resting cots; between these two small rooms there is an additional room for warming the clothes to be worn by the children during the time spent in the open air. In this room the children hang their street clothes, which will then be dried, and occasionally disinfected.

Off from these three rooms are on one side a toilet room and shower bath for girls and on the other side the same for boys, and in addition there is a teachers' room with toilets.

Below the central part of the building is the cellar, in which the heating plant is situated. The heating plant is arranged so that warm air may be conveyed under the floor of the class rooms (which have no means of warming), so as to take the chill off the floor.

The building faces south. If necessary, the porch during the summertime may be shaded by an awning.

In an interesting article in the *Survey,* April 23, 1910, Dr. Thomas Spees Carrington, of New York City, writes:—

"In constructing a new building, the model school room is built so that all sides can be open or closed. This protects from storm or wind from any direction, and still allows two sides of the class room to be open.

"In cities the flat roofs of school buildings are the logical sites, for there buildings can often be erected without making structural changes in the school house.

"An open-air school room for 30, which can be built on the flat roof of a school or in the school yard, is shown in the accompanying illustrations. It is generally considered that a larger class cannot be handled satisfactorily. This building is 20 feet wide, 30 feet long, and 12 feet high at the peak of the roof. It can be built for about $500. It is constructed very simply, but when painted it is not unsightly. When filled with children and decorated with window boxes it makes a very interesting and attractive picture. The roof is supported at the corners and at the center of the end walls by posts four inches square. These are reinforced by 2 x 4 inch timbers placed four feet apart on all the sides of the building, while the center of the roof is carried by one 3 x 6 inch timber girder running the length of the room and strengthened by a post in the middle. The rafters are laid on the girder with a wooden ceiling above, made of 2-inch tongued and grooved boards, and covered on the upper side by rubberoid or tar-paper roofing. The floor is made of narrow floor boards laid on 2 x 4 inch supports and covered by battleship linoleum. All sides for a height of three feet are inclosed with 2-inch-wide tongued and grooved boards, or by novelty siding. The north and west sides are enclosed by alternating panels of narrow boards and long glass and sash windows hung from the ceiling, while the south and east sides are open above the wainscoting, but protected from wind and storm by canvas curtains on rollers, which carry them entirely out of the way when not in use. In some climates the canvas curtains are replaced by glass and sash windows."

The simpler the plans and the less expensive the system of maintenance consistent with efficiency, the better. In an experience covering both public schools and institutions, I have seen so many children held in these places at public expense in order to keep up their attendance and insure the continuance of the organization that extravagances which act as bribes to the children should be eliminated.

The equipment and maintenance of the open-air school necessitate Eskimo suits, double wool blankets, canvas cots, and sleeping bags, costing together $14, and miscellaneous articles (felt shoes, soapstones for feet warming, towels, toothbrushes, *et cetera*), costing a few dollars more. Provisions and milk cost 16 to 25 cents per day for each child. Salaries are the greatest expense. The physician of course is not paid—unless he be a medical inspector. The Board of Education furnishes the teacher, but, as the class is small, the expense per capita is double the usual. The matron receives $50 or $60 per month, and the cook and assistant matron each about $40.

The daily management of the open-air sanatorium school is interesting, showing, as it does, a close adherence to the program of fresh air, food, rest, and light exercise used by tuberculosis sanatoria. In some open-air schools, a daily cold shower bath is taken preliminary to the day's program. This of course necessitates facilities not everywhere obtainable. At Providence, in the summer, the school work is exchanged for gardening, the children beginning at 8 o'clock in the morning. I have before me the routine (winter) programs of the Elizabeth McCormick

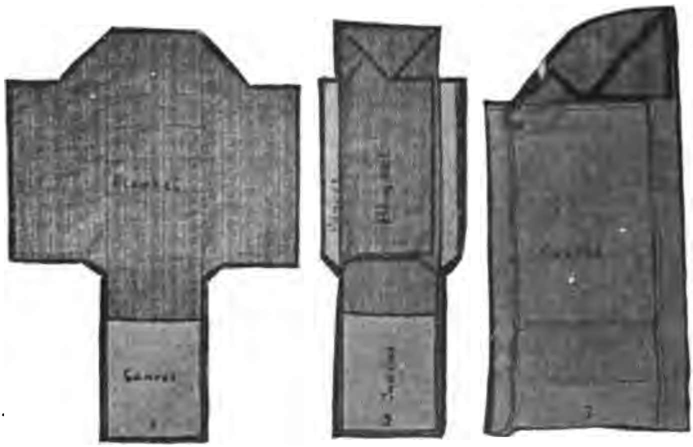


Fig. 46.—Eskimo sleeping bag, designed by Dr. Thomas Spees Carrington.

School, of Chicago, a New York school described by Dr. Carrington, and the Providence School, described in "School Hygiene" by Miss Isabel Hyams. Their general similarity is evident and will assure the educator uncertain as to the best method of procedure.

Daily Program of Open-air School.

New York.

8.45 to 9.00.	Arrive at school, warm up.
9.00 to 9.30.	Fed with egg and large glassful of milk. Rest outdoors in sleeping blankets.
9.30 to 10.30.	School work.
10.30 to 10.45.	Short recess, feeding with milk and bread.
10.45 to 11.30.	School work.

11.30 to 12.30.		Recess, go to wash room and prepare for dinner.
12.30 to 2.00.		Rest in bed, encouraged to sleep.
2.00 to 3.00.		School work.
3.00 to 3.15.		Short recess, feeding of milk and bread.
3.15 to 4.00.		School work.
4.00 to 5.00.		School dismissed, play an hour.
5.00.		Go home.

(Some afternoons the school work is manual training.)

PROVIDENCE.

8.45 to 9.00.	Arrive at school, wash face and hands, eat breakfast.
9.00 to 9.15.	Work in class room by one section while the other is doing work in kitchen and dining room.
9.15 to 9.30.	Opening exercises.
9.30 to 9.35.	Physical exercises.
9.35 to 10.00.	Number work.
10.00 to 10.05.	Breathing exercises.
10.05 to 10.20.	Spelling.
10.20 to 10.40.	Number work.
10.40 to 11.00.	Recess.
11.00 to 11.15.	Reading, C.
11.15 to 11.30.	Reading, D.
11.30 to 11.35.	Rest period, relaxation.
11.35 to 11.50.	Reading, B.
11.50 to 12.00.	History.
12.00 to 12.15.	Play and work in dining room.
12.15 to 12.30.	Washing.
12.30 to 1.00.	Dinner.
1.00 to 1.15.	Brushing teeth, kitchen and dining room work
1.15 to 1.30.	Preparatory work in class room.
1.30 to 1.45.	Music and voice drill.
1.45 to 2.15.	Divisions C and D, rest. B and A, language or geography.
2.15 to 2.45.	B and A, rest.
2.45 to 2.55.	Physical exercise.
2.55 to 3.30.	Drawing, which may be: Sketching, cutting, painting, and manual work.
3.30 to 3.45.	Play games in groups; prepare tables for supper.
3.45 to 4.00.	Washing.
4.00 to 4.30.	Supper.
4.30 to 5.00.	Home.

(Study periods are not more than twenty minutes each.)

CHICAGO.

8.00	Arrive at school.
8.00 to 8.30.	Temperature taken and inspection by nurse.
8.30 to 9.00.	Bath and lunch.

9.00 to 10.15.	In school.
10.15 to 10.30.	Recess.
10.30 to 11.45.	In school.
11.45 to 12.00.	Get ready for dinner.
12.00 to 12.45.	Dinner.
	Section 1:
1.00 to 2.15.	Rest.
2.15 to 3.15.	In school.
	Section 2:
1.00 to 2.15.	In school.
2.15 to 3.15.	At rest, play, or gymnastics.
3.15 to 4.00.	Temperature and lunch.
4.00.	Return home.
6.30.	Supper at home.
8.00.	To bed.

The results of the open-air sanatorium school are just as remarkable as those of sanatoria for tuberculosis elsewhere, and, to the teaching profession just awakened to practical hygiene, they are in the nature of a revelation. The children gain in weight and healthy appearance just as they do at the seashore or country. Some organizations, notably those of Bradford, England, and Chicago, have proven their claims by weighing and measuring the children. Bradford went a step further and weighed and measured a number of other children for the purpose of comparison. The increase in hemoglobin percentage was also noted at Bradford as it came up toward normal.

Concerning the improvement in the Chicago children, "Open-air Crusaders" says:—

> "Of the 30 cases chosen for the experiment, 17 were first-stage cases of tuberculosis; 2 had tubercular glands. Sixteen had been and 10 were still directly exposed to tuberculosis in their homes. None had passed to the open or infectious stage, all such cases being excluded; but two-thirds of them showed a temperature ranging from 99° to 100.2° on admission." [The subsequent temperatures, systematically taken, are not given.] "On discharge only 2 showed a temperature above 99, while the rest were practically normal. The total gain in weight for the 30 children was 113 pounds, the range being from 1 to 7 pounds. The average gain was 3.8 pounds."

The average gain in weight per year is more than this, but it should be remembered that many malnourished children are flabby rather than emaciated. This proof that the school is not

forcing its statistics proves the value of the report. Open-air schools exist, however, in which the children did show a rapid gain in weight, notably another class in Chicago, in which 30 children gained an average of 4 pounds in thirty days, and the open-air school in Bradford.

That the children learn well in their classes, are free from colds, and like the open-air schools is invariably reported. Under the inspiration of interested teachers and individual attention they appear to be able to do the grade work in the curtailed study hours. Some are even reported to have caught up in back work. Probably they were older children plowing through elementary work. In Chicago the home-like welcome and fleshpots proved so tempting that the Christmas vacation was ignored at the request ("demand") of the children.

Those interested in this subject should read "Open-air Schools," by Leonard P. Ayres, of the Russell Sage Foundation, and "Open-air Crusaders," edited by Sherman H. Kingsley and distributed by the United Charities of Chicago. The bibliography of the subject is given in each.

RESULTS OF MEDICAL INSPECTION.

The results of medical inspection may be viewed both from the standpoint of work done and that of the degree of success attained. It is well, therefore, to so classify the subject-matter here presented.

WORK DONE.

The total figures taken from the reports of large cities are interesting and instructive because they show not only the enormous volume of work done by medical inspectors, nurses, and allied forces, but also the endless variety of physical defects and contagious diseases encountered. New York City may first be studied because of its premier position, in size at least, among our American cities. The figures for Philadelphia may be taken as fairly representative of such other of our larger cities as Chicago, Boston, and St. Louis.

The following statistical tables are given:—

1. New York City, 1910, excerpts from general report.
2. Philadelphia, 1909, annual report.

3. Philadelphia, 1910, report on work of the school nurses.
4. Philadelphia, 1910-11, report of the city dental dispensary.
5. New York City special report on trachoma.
6. Chart showing work performed by one medical inspector in one day.

Report of Work of Medical School Inspection in New York City for Year Ending December 31, 1910, by Dr. S. Josephine Baker, Director of Child Hygiene.

WORKING FORCE.

District (borough) chiefs	6	Head nurse	1
Assistant medical inspectors	136	School nurses	136

VISITS AND INSPECTIONS.

Visits to homes:—	
By inspectors	65,244
By nurses	179,822
Visits to dispensaries	932
School consultations	44,218
Class inspections:—	
By inspectors	1,751,809
By nurses	2,645,115

Number physical examinations for non-contagious defects	266,426
Total number defective children found	196,664
Total number defects found (for details see next section)	301,624

EYE AND SKIN DISEASES.

	Found.	Excluded.	Instructions and Treatments.
Pediculosis	153,797	1,497	882,907
Trachoma	20,915	498	252,153
Conjunctivitis	26,855	1,547	189,006
Ringworm	4,805	190	38,051
Scabies	2,251	207	21,045
Impetigo	9,052	162	57,957
Favus	290	27	2,434
Molluscum contagiosum	143	3	908
Miscellaneous	46,017		72,053
Total	263,828	4,131	1 516,514

GENERAL CONTAGIOUS DISEASES.

	Excluded.	Found at Home.
Diphtheria	738	71
Scarlet fever	203	317
Measles	628	1,280
Chicken-pox	1,235	659
Pertussis	244	415
Mumps	1,024	243
Tuberculosis	101	1
Total	4,173	2,986

PHYSICAL EXAMINATIONS FOR WORKING PAPERS.

Number examined	24,673
Number needing treatment:—	
Number with defects other than teeth only	6,874
Number with defective teeth only	8,382
Number with defective vision	2,072
Number with defective hearing	127
Number with defective nasal breathing	1,840
Number with hypertrophied tonsils	3,100
Number with tuberculous lymph-nodes	11
Number with pulmonary disease	23
Number with cardiac disease	131
Number with chorea	41
Number with orthopedic defect	75
Number with malnutrition	271
Number with defective teeth	12,114
Number with defective palate	3

Results of Medical Inspection in Philadelphia for the year ending December 31, 1909. Dr. Charles A. Groff, Assistant Chief Medical Inspector, Bureau of Health.

CHARACTER AND POPULATION OF SCHOOLS VISITED.

	Boys.	Girls.	Total.
Grammar schools	25,386	27,538	53,374
Primary schools	49,212	47,388	96,600
Kindergarten schools	2,269	2,418	4,687
Special schools	808	107	915
Grand total	78,125	77,451	155,576

SUMMARY OF WORK PERFORMED BY MEDICAL INSPECTORS IN PUBLIC SCHOOLS.

		Average.
Total number of schools visited		311
Total number of visits to schools		52,235
Total number of pupils sent to inspector by principal		100,826
Treatment recommended		49,564
Excluded	Boys 3,080; Girls 3,880	6,960
Pupils readmitted		7,520
Vaccinations		6,619
Individual examinations		86,482
Total examinations		256,311
Vaccination certificates signed		69,003
Home visits		1,321

EXCLUSIONS FOR CONTAGIOUS DISEASE.

Disease.	Days lost.	Disease.	Days lost.
Diphtheria	27	Dermatitis	34
Diphtheria (contact)	7	Enuresis	7
Scarlet fever	41	Otitis media	2
Scarlet fever (contact)	19	Suspected scarlet fever	9
Measles	132	Bronchitis	14
Varicella	380	Laryngitis	3
Pertussis	85	Iritis	1
Pediculosis	1,830	Positive cultures	28
Trachoma	24	Simple continued fever	4
Acute conjunctivitis	819	Catarrh	1
Scabies	287	Suspected diphtheria	10
Ringworm T—	191	Foreign body in cornea	1
Ringworm C—	257	Infected wound	2
		Enlarged gland of neck	1
Impetigo	432	Pseudomuscular hypertrophy	1
Tonsillitis	623	Indigestion	1
Mumps	503	Herpes	2
Favus	20	Abscess	1
Mollus contagiosum	5	Ozena	2
Acute coryza	93	Keratitis	3
Unvaccinated	968	Paronychia	2
Angina	43	Phthisis	1
Pharyngitis	13	Rhinitis	1
Otorrhea	2	Syphilis	1
Chorea	3	Tubercular adenitis	1
Eczema	9		
Unclean	14	Total	6,960

AVERAGE LOSS OF TIME SUSTAINED BY PUPILS IN 1909.

[Excluded for the following diseases:]

Disease.	Days lost.	Disease.	Days lost.
Diphtheria	23	Mumps	19
Diphtheria (contact)	12	Favus	58
Scarlet fever	43	Mollus contagiosum	
Scarlet fever (contact)	16	Unvaccinated	7
Measles	23	Otorrhea	2
Varicella	17	Unclean	1
Pertussis	44	Otitis media	14
Pediculosis	4	Enuresis	21
Trachoma	28	Chorea	60
Acute conjunctivitis	6	Simple angina	3
Scabies	21	Pharyngitis	3
Ringworm { T—	53	Ozena	5
Ringworm { C—	15	Positive cultures	15
Impetigo	12	Acute coryza	5
Tonsillitis	7		

Eye, Ear, Throat, Nose, Skin, and Orthopedic Difficulties Encountered by Assistant Medical Inspectors in Medical Inspection of Schools.

EYE AFFECTIONS OF CONJUNCTIVA.

Acute conjunctivitis	990	Trachoma	1
Chronic conjunctivitis	683	Subconjunctival hemorrhage	13
Phlyctenular conjunctivitis	50		
			1,737

MUSCULAR AND NERVOUS AFFECTIONS.

Nystagmus	10	Strabismus	346
			356

AFFECTIONS OF CORNEA.

Interstitial keratitis	18	Corneal opacity	12
Corneal ulcer	54	Macula of cornea	2
			86

AFFECTIONS OF THE LID.

Blepharitis marginalis	632	Foreign body in eye	179
Hordeolum	467		
Ptosis	14		1,305
Chalazion	6	Under head of "Defective	
Dacryocystitis	7	Vision"	13,480

MOUTH.

Stomatitis	30	Tongue-tie	11
Alveolar abscess	44	Gingivitis	2
			87

EAR.

Otalgia	37	Impacted cerumen	149
Otitis media	349	Under head of "Defective Hearing"	652
Otorrhea	158		
			1,345

NOSE.

Rhinitis	261	Deflected septum	991
Postpharyngeal catarrh	1,096	Ozena	7
			2,355

THROAT.

Tonsillitis	8	Adenitis	345
Laryngitis	209	Tubercular adenitis	8
Pharyngitis	287	Cleft palate	24
Hypertrophied tonsils	7,935	Simple angina	116
Adenoids	1,724		
			10,656

SKIN.

Acne	96	Impetigo	265
Alopecia	26	Lupus vulgaris	1
Bromidrosis	2	Paronychia	6
Comedo	1	Pediculosis	3,138
Dermatitis	226	Prurigo	1
Eczema	1,661	Psoriasis	14
Erythema	12	Ringworm	239
Erysipelas	1	Scabies	10
Favus	4	Seborrhea	15
Furunculosis	350	Urticaria	45
Herpes	536	Verrucæ	27
Hyperidrosis	1		
Ichthyosis	7		6,684

ORTHOPEDIC.

Torticollis	36	Talipes equinus	3
Scoliosis	58	Genu valgum	16
Lordosis	5	Genu varum	13
Kyphosis	10	Rickets	6
Coxalgia	44	Stoop shoulders	53
Talipes varus	4		
Talipes planus	3		251

TEETH.

Under the head of "Defective Teeth" 6,873

MISCELLANEOUS.

Chorea	71	Round shoulders	53
Cretinism	3	Cigarette smoking	5
Enuresis	75	Arthritis	2
Epistaxis	11	Hydrocephalus	2
Rheumatism	79	Diarrhea	1
Tubercular glands	1	Enteritis	8
Heart disease	33	Pleurisy	2
Headache and nausea	426	Flat chest	1
Indigestion	341	Swollen jaw	2
Gastritis	18	High temperature	1
Mentally deficient	214	Malaria	1
Unclean	32	Tubercular ankle	1
Epilepsy	21	Atropine poisoning	1
Malnutrition	170	Orchitis	1
Nephritis	1	Ptomaine poisoning	2
Tuberculosis	16	Habit-spasm	2
Spastic paraplegia	25	Albinoism	1
Influenza	9	Syncope	1
Stab wound	1	Masturbation	5
Bullet wound	1	Neurasthenia	63
Tumor	4	Myositis	25
Dislocation	8	Constipation	13
Fracture	26	Leucorrhea	1
Sprain	127	Tapeworm	1
Hernia	3	Neuralgia	18
Burns	184	Hiccough	1
Bruise	21	Pneumonia	1
Re-vaccination	168	Jaundice	1
Dog bite	16	Disease of bone	1
Ulcer of leg	4	Convulsions	2
Splinter extracted	8	Hysteria	1
Osteomyelitis	2	Cystitis	1
Goiter	6	Asthma	1
Keloids	1	Synechiæ	1
Anemia	48	Spasmodic croup	1
Bronchitis	686		

NUMBER OF VACCINATIONS BY SCHOOL INSPECTORS.

Number of school children vaccinated	6,619
Other vaccinations by the medical inspectors	5,276
Total	11,895

NUMBER OF SCHOOLS DISINFECTED AT INSTIGATION OF MEDICAL INSPECTORS DURING 1909.

January	21	July	180
February	31	August	17
March	45	September	30
April	48	October	55
May	32	November	85
June	13	December	27
		Total	584
		Parochial schools	31

REPORT OF THE OPHTHALMOLOGIST.

Number of visits to the City Free Dispensary	5,017
Number of children treated (new cases)	1,511
Number of refractions done	1,304
Number of pairs of spectacles furnished free	1,139
Number of broken spectacles replaced	20
Number of suspected contagious cases examined by request (including 61 cases of trachoma)	168
Number of cases of eye trouble other than refractive error and trachoma	179

Report of Head School Nurse, Miss Anna M. Stanley, Philadelphia, 1910.

1. GENERAL SUMMARY OF WORK DONE.

Number nurses	6
Number schools	31
Number scholars in attendance	24,000
School work:—	
Number visits to schools	4,213
Number treatments and advisements in school	37,730
Number new cases treated in school	10,279
Number cases cured at school	6,788
Home work:—	
Number visits, advice, and treatments at home	5,896
Number new cases visited at home	2,005
Number cases cured at home	926
Dispensary work:—	
Number visits and treatments at dispensary	2,975
Number new cases treated at dispensary	1,375
Number cases discharged cured at dispensary	1,738
Totals:—	
Total number visits paid	13,084

DISEASES AND DEFECTS HANDLED BY THE SCHOOL NURSES.

Diseases.	Cases.	Cured.	Improved.
Pediculosis	4,556	2,631	1,908
Acute conjunctivitis	495	382	113
Keratitis	7	4	2
Nebula of cornea	1	1	
Trachoma	6	1	3
Stye	60	58	2
Blepharitis	6	3	3
Scabies	37	22	15
Ringworm of scalp	226	218	8
Ringworm of body	98	98	
Impetigo	209	174	35
Favus	3	2	
Eczema	760	643	117
Pustular dermatitis	77	62	15
Infected wounds	1,531	1,328	208
Cataract	1	0	
Incontinence of urine	7	2	3
Orthopedic defects	16	0[1]	
Cyst of wrist	1	1[2]	
Cellulitis	1	1	
Myositis	1	1	
Alopecia areata	4	0	4
Stomatitis	1	1	
Cervical adenitis	25	6	14
Discharging ear	27	0	12
Nasal catarrh	11	5	3
Sore throat	18	18	
Sprain of wrist	6	6	
Ulcer of leg	1	1	
Tuberculosis of knee	1	0	1
Phthisis of eyeball	1	0[3]	
Goiter	1	0	1
Nervous	6	0	4
Defective hearing	10	2	0
Tuberculosis of lungs	2[4]		1[5]
Defective speech	4	0	0
Infantile paralysis	1	0	0
No vaccinations	12	12	
Miscellaneous	2,824	2,501	323
Total	13,659	9,452	3,013

[1] Two operations, 2 braces, 2 pairs of shoes.

[2] Operated.

[3] Operated, eye removed.

[4] One latent.

[5] One State Dispensary.

Total number treatments	
Total number new cases treated	
Total number cases discharged as cured	9,452
Total number cases reported improved	3,013

2. DISEASES AND DEFECTS HANDLED BY THE SCHOOL NURSES.

Number children with defective vision who obtained glasses through efforts of school nurses	1,025
Number operations for adenoids and enlarged tonsils	249
Number children suffering from malnutrition sent to country for short time and all benefited	85
Applications filed for children to go to seashore and country during this summer	94
Children admitted to permanent institutions (2 to Spring City for Feeble-minded; 4 to Epileptic Hospital and Colony Farm, Oakbourne)	6
Applications filed for permanent home (1, Epileptic Hospital; 1, Mt. Airy Institute; 1, Spring City)	3
Number children with defective teeth treated at dental clinics	319
Permits waiting for admission to hospitals for nose and throat operations	35
Individual examinations for pediculosis	17,826
Number of children sent to seashore and country	77
Number of operations for removal of eyeball (glass eyes fitted)	2

Report of Dental Dispensary, Philadelphia, from October, 1910, to February, 1911, Inclusive.

Number of patients	1,393	Pulps:—	
Fillings:—		Pulpitis	507
Amalgam	1,306	Capped	54
Gutta-percha	260	Devitalized	4
Cement	190	Extracted	25
Copper cement	48	Al-Abscess	15
Canals:—		Cleansing	158
Dressed	104	Extractions	668
Filled	23	Miscellaneous	143

Cases of Trachoma Found in the Public Schools of the Borough of Manhattan, New York City.[1]

(Comparative Table.)

	Cases Found.	Cases Excluded.
Second six months, 1907	12,555	567
1908	29,968	999
1909	31,037	658
1910	13,247	229

[1] See Prevalence of Diseases (Trachoma).

Chart Showing Amount of Work Performed by One Philadelphia Medical Inspector in One Day, with Variations Due to the Social Character of Children.

	Better class American neighborhood (Allison, Clag-horn, Camac schools).		Poor American children (McKinley, Miller, and Hart-ranft schools).		Foreign (Italian and Russian-Jewish) children (Washington, Mt. Vernon, Hay, and Wharton schools).		
	Oct. 22, 1907.	Oct. 23, 1907.	Feb. 21, 1908.	Feb. 25, 1908.	Mar. 18, 1908.	Mar. 19, 1908.	Mar. 20, 1908.
Number children routinely examined	20	20	20	20			20
Number suspicious cases sent by teacher	10	9	25	20	60	52	45
Number children found defective	8	10	16	14	41	39	47
Defects found:—							
Eye-strain	7	9	8	7	11	15	9
Conjunctivitis					1	1	1
Blepharitis							1
Blepharospasm			1				
Squint					1	1	
Stye					3		
Ulcer of cornea						2	
Nasal obstruction	2		11	5	2	5	7
Nasal catarrh				2	1	1	9
Deflected septum	1						
Enlarged tonsils	1	2	3	1		1	1
Cervical adenitis							1
Cervical adenitis (sinus)	1						
Acute sore throat (culture taken)					1		
Defective speech				1			
Defective hearing			1	4		1	2
Discharging ears				1			3
Decayed teeth		2	1				3
Poor nutrition							3
Stoop shoulders	1		1	2			
Synovitis (knee)						1	
Nervous exhaustion			1	2			
Chorea			1				
Asthma		1					
Eczema			1	1	4	6	5
Impetigo					1	2	
Eczema seborrhœica							1
Furuncle						1	
Pustular dermatitis							1
Scabies						1	1
Abrasion of skin							1
Lacerated wound of skin						2	1
Infected wound of skin						1	2
General uncleanliness							2
Ganglion (wrist)						1	
Acute indigestion				1			
Mental deficiency							
Vaccinations						2	
Mumps				2			
German measles						1	
Not vaccinated	13	1					
		16	31	29			

Leaving the consideration of municipal reports, we may next take up the volume of work done by the individual medical inspector. As we have seen, this varies remarkably, owing to the great number of skin diseases, and to the greater number of physical defects of all kinds (except refractive error) found in the poorer districts. Demonstrating this fact, the preceding chart shows the record of a day's work by one inspector in several Philadelphia schools, each expressive of a certain social grade in the community.

How many cases may a medical inspector find in one school which have been sent to him by the teachers on their own initiative? In the better sections of the city, populated by well-to-do Americans, the routine examination of all the children raises the health standard, so that subsequently very few children are found to need medical attention. The writer has made visits when no cases have been sent to him, and others which have yielded a single case of physical defect, and one or two vaccination marks to be inspected because of entrance into school. In the poorer districts the inspector who keeps his teachers alert by progressive methods may anticipate 4 or 5 incidental cases at every daily visit. Down in the foreign quarter the number sent to the medical inspector may vary from 5 to 50. On one occasion at the Wharton School, the writer remembers seeing 60 children, and the first day after his transfer to the foreign quarter, the Mt. Vernon School, which had been without inspection for several weeks, yielded 45 cases. An old memorandum sheet from the Washington School (all Italian children) happens to be at hand. It shows that the incidental cases found in a day were: Eye-strain, 6; nasal obstruction, 6; enlarged tonsils, 1; cervical adenitis, 1; decayed teeth, 2; pediculosis, 1; eczema, 6; poor nutrition, 1; acute sore throat, 2.

The sum total of a medical inspector's work in a slum district is quite impressive. The writer was accustomed to about 180 recommendations per week (for the correction of physical defect), and 8 or 10 exclusions for contagious disease. If these schools had not had nurses, the number of additional exclusions for pediculosis would probably have been 25 a week.

The amount of work which a nurse can do in a day is best shown by first stating that she is supposed to work but five hours.

During this time she may either advise and treat 40 or 50 children or visit 6 or 8 homes. Practically, she combines these activities, and, it may be remarked, works seven hours daily instead of five. From what I have seen of the work I should say that a nurse working in a congested district covering four schools daily, and calling on parents who live near the school, is able, in the schools, to treat 30 or 40 cases of minor skin trouble, and give advice to 30 or 40 other children. Between and after school sessions she can call upon three or four parents. On a day in which she takes a number of children to the dispensary, which may happen one or two afternoons a week, the school work must be somewhat less than that just mentioned, and the home visits are omitted. It should be remembered that the nurse must keep records of her work, involving the consumption of considerable time.

SUCCESS OF MEDICAL INSPECTION.

The success of the work of medical inspection is judged by the reduction in the number of cases of contagious diseases, and the number of physical defects corrected.

Regarding the suppression of contagious disease we have, unfortunately, few if any trustworthy figures. The eruptive fevers vary from year to year from causes some of which are not connected with the schools, such as unsanitary conditions and certain climatic conditions. In the case of measles (and possibly chicken-pox) we have a disease so contagious that its occurrence depends on the number of non-immune young children that have arrived since the last epidemic. Medical inspection so far has not influenced it in the least. Finally, we unearth so many mild cases of diphtheria by means of the culture tube and bacteriological diagnosis that a comparison of the number of "diphtheria" cases found in 1905 and 1910 might give very misleading statistics.

However, every faithful and experienced medical inspector can recall numerous instances in which diphtheria, or scarlet fever, or mumps epidemics have been checked, and every experienced city school principal can testify that the deadly epidemics of diphtheria infecting 15 in one class room no longer occur.

These facts must be acknowledged, even while we, on the other hand, admit that contagious diseases will continue so long as bad drainage conditions, poor ventilation, overcrowding, and unhealthy throats exist. In the year 1905, just before medical inspection was inaugurated in Philadelphia, one class in the Sartain Primary School suffered from 17 cases of diphtheria, of whom 4 died. The teacher was in the habit of kissing the children good-bye at the close of the afternoon session, and told the writer, during her tale of the epidemic, that she suffered from a sore throat also at the time. Compare this occurrence with the outbreak of 4 cases of diphtheria in the Camac School, Philadelphia, in 1907. These cases were reported on the same day. At once a throat culture was taken from every child in the class, and 12 of these found to contain diphtheria germs. These children were excluded, their parents notified of the condition of affairs, and no further cases developed.

Regarding the suppression of the minor contagious diseases, the work of the medical inspectors and nurses has produced marvelous changes. The number of pediculosis cases is only a fraction of that of six years ago, and the same can be said of ringworm, scabies, pustular eczema, and impetigo. The first onslaught of the school inspectors of New York City resulted in the exclusion of so many cases that the school nurse was introduced in order to get the excluded children back into school. The children of the slums become reinfected at home, and the suspension of medical inspection is marked by the reappearance of the diseases mentioned. Hence, the suppression of the minor skin affections is a good deal like bailing out a leaky boat.

A perusal of the preceding paragraphs, showing the statistics of medical inspection, reveals the great number of cases of contagious disease found in our schools. Since the health authorities promptly exclude these cases (except minor ones treated by school nurses), the question of the willingness of the parent to correct the trouble does not arise.

The success of medical inspection in correcting the physical defects of children depends upon the character of the population, the existence of free dispensaries, the help of the school nurse, the energy of the medical inspector, and the co-operation of the teacher.

The average medical inspector, by the use of printed notices, can secure in an American neighborhood treatment for about 30 per cent. of his eye-strain cases, and about 50 per cent. of his nose and throat cases. Unfortunately, the latter, when treated by family physicians, are often maltreated, and the percentage of sufferers from adenoids who secure vigorous treatment with resulting cure is small. While it is true that many of the milder cases do not require surgery, it is a sad fact that many family physicians pass up the eye-strain cases because they themselves do not refract eyes, and stand willing to take any case of

Fig. 47.—Results of medical inspection. Total school population, 700. Children wearing eye-glasses shown in picture, 106. Medical inspector and nurse, immigrant quarter, free dispensaries.

nose and throat trouble because the latter is susceptible of mild local treatment, even though this treatment does but little good.

Among the best classes the correction of eye-strain and diseased nose and throat conditions, after notification, is the rule.

Among the poor Americans the response, if a dispensary be handy, is better than in any other social class.

The response of the foreign poor to written notices is practically *nil.* On the other hand, the remarkable response to careful medical inspection and personal work by the nurse, combined with free-dispensary facilities, is shown by the reports following, and by the accompanying photograph of children who obtained eye-glasses:—

The correction of decayed teeth is an almost impossible task in this present generation. Among the better classes considerable success attends the medical inspector's efforts, but these are the smallest fraction of the whole school population. In the poorer classes the acquiescence of docile foreign parents to any offer of free treatment enables the school nurses to procure dispensary treatment for as many as they can take to the large dental clinics. This number may run into the thousands if the nurses devote their time specially to this phase of the work. The writer remembers but one boy in the foreign section of Philadelphia who went to a private dentist on being notified of the existence of carious teeth. Probably 2000 parents were sent notices. The child hygiene pamphlet published by the New York Department of Health states that 24 per cent. of the dental treatments in the poorer section of the city were by private dentists, the other 76 per cent. being dispensary treatments. These figures are taken from the records of a special investigation with special methods, and I cannot but feel that the large proportion of private treatments resulted from some unusual feature in the work. The hope of the future lies in the instruction of the child in dental hygiene.

The success of the school nurse forms an important chapter in the history of medical inspection. Just as the salesman can produce trade by means of a personal interview where an advertisement will fail, so a social visitor (nurse or not) can produce results where printed notices are ignored. Unthinking persons have at times endeavored to compare the medical inspector with the nurse in point of efficiency. This is illogical, since their functions are entirely distinct.

While the nurse produces a tremendous increase in the efficiency of medical inspection, it should be remembered that her services are costly, and, certainly in the better districts of the city, where the parents are intelligent and the children live some distance from the school, the nurse should visit the home only when printed notices have failed to obtain a response. To employ a nurse in such cases is like turning one's bills over to a collection agency before sending them out in the usual manner.

Down in the slums the nurse is a necessity, and at the same time is remarkably effective. In the New York pamphlet before

mentioned is given the results of an experiment which shows that the school nurses obtained the correction of defects, *after one interview only,* in 62 per cent., 65 per cent., 48 per cent., and 59 per cent. of the cases visited in 4 schools, respectively. A more extended study of the subject is given in the last of the following tables.

The following tables are presented to show the degree of success attained by medical inspection under different conditions:—

1. Results of medical inspection (*a*) under different social conditions, (*b*) with and without nurses.

2. Results of medical inspection, New York City, total figures.

3. Comparative table of results in a foreign section of Philadelphia: (*a*) without a nurse, (*b*) with a nurse.

4. School nurses' report, showing proportion of defects corrected (foreign section).

5. School nurses' report, showing character of social work required to accomplish successful results (foreign section).

New York City. Proportion of Defects for which Treatment was Secured for the Year Ending December 31, 1910, by Dr. S. Josephine Baker, Director of Child Hygiene.

Defects.	Number Defects Found.		Number Defects Treated.
Defective vision	29,634	By glasses	9,929
		By treatment	5,598
		Total	15,527
Defective hearing	1,519	955	
Defective nasal breathing	40,946	By operation	8,714
		By treatment	14,370
		Total	23,084
Hypertrophied tonsils	50,012	By operation	10,275
		By treatment	16,743
		Total	27,018

Defects.	Number Defects Found.		Number Defects Treated.
Tuberculous lymph-nodes ...	759	415	
Pulmonary disease	656	447	
Cardiac disease	2,370	1,426	
Chorea	951	584	
Orthopedic defects	1,083	By medical treatment..	453
		By physical culture....	637
		Total	1,090
Malnutrition	8,691	By medical treatment..	3,798
		By instruction	1,670
		Total	5,468
Defective teeth[1]	164,250	By extraction	10,978
		By filling	15,197
		Total	26,175
Defective palate	153	59	

Results of Medical Inspection in the Foreign Section of Philadelphia (a) *Without School Nurses;* (b) *With School Nurses, by Dr. Sol. W. Newmayer.*

RESULTS OBTAINED BY A MEDICAL INSPECTOR WHEN NOT AIDED BY A NURSE.

Number defective children.	Number defects found.		Number defects corrected.	
751	Defective vision	272	70	25.8 per cent.
	Hypertrophied tonsils	338	62	18.4 "
	Adenoids	36	5	13.9 "
	Defective teeth	152	31	20.4 "
	Total	798	168	21.1 per cent.

[1] Owing to the difficulty of securing treatment, defective primary teeth are not referred for treatment; but out of 94,630 such cases, 64,498 were given instructions in mouth hygiene.

10

Chart Showing Percentage of Defects Corrected (a) *Under Different Social Conditions,* (b) *With and Without Nurses.* (*Author's Cases.*)

	Group I. American children, poor to moderate circumstances.			Group II. American children, well-to-do.			Group III. American children, very poor, white, and colored.			Group IV. (This group with school nurse.) Italian, Russian, Jewish, and Polish children, poor and very poor.			Total. Showing average results.		
	No. defective cases.	Cases treated.	Percentage of cases treated.	No. defective cases.	Cases treated.	Percentage of cases treated.	No. defective cases.	Cases treated.	Percentage of cases treated.	No. defective cases.	Cases treated.	Percentage of cases treated.	No. defective cases.	Cases treated.	Percentage of cases treated.
Defective eyesight	482	218	44	88	30	36	28	20	71	278	246	88	871	514	59
Nose and throat: Enlarged tonsils	74	34	46	2	2	100	12	3	25	36	31	86	124	70	56
Nose and throat: Nasal obstruction	205	96	47	22	5	23	8	2	67	81	65	80	311	168	54
Nose and throat: Nasal catarrh	7	4	57	0	0		2	2	100	21	18	14	30	24	80
Defective hearing	75	28	38	0	0		0	0		18	18	72	93	41	44
Discharging ears	31	12	39	0	0		4	4	0	18	16	89	53	32	60
Decayed teeth	73	36	49	0	0		1	0		76	66	87	150	102	68
Poor nutrition	38	19	50	17	5	29	0	0		4	4	100	59	28	47
Eczema	6	3	50	0	0		3	3	100	11	11	100	20	17	85
Other skin diseases	4	2	50	0	0		0	0		6	6	100	10	8	80
Miscellaneous	19	12	63	0	0		7	5	71	34	33	97	60	50	83
Cases cured by nurse in school										380					

Group I—McKinley, Rutledge, Todd, Kane, Morris, Sartain Schools. Group II—Allison School. Group III—Ninth Street Primary School. Group IV—Fletcher, Watson, Mt. Vernon, Burk, Wharton, Hay, Nebinger, and Washington Schools.

Group IV, comprising foreign children, shows good results of medical inspection because of the universal use (or abuse) of free dispensaries, the docility of parents, and the aid of school nurses.

Fig. 48.—An "adenoid party" before operation. Mothers and children waiting at Good Samaritan Dispensary. (Courtesy Bureau of Municipal Research and of Health Department, New York City.)

RESULTS OBTAINED DURING THE SAME PERIOD BY THE SAME MEDICAL INSPECTOR WHEN AIDED BY A SCHOOL NURSE.

Number defective children.	Number defects found.		Number defects corrected.	
704	Defective vision	441	355	80 5 per cent.
	Hypertrophied tonsils	104	68	65.4 "
	Adenoids	62	45	72.6 "
	Defective teeth	150	138	92.0 "
	Total	757	606	80.0 per cent.

SAME INVESTIGATION, SHOWING RESULTS BY SCHOOLS.

School.	Nurse.	Number of recommendations.	Recommendations acted upon.	Percentage acted upon.
1	Nurse	324	262	80.86
2	Nurse	445	434	97.53
3	Nurse	320	282	88.12
4	Nurse	264	226	85.28
Total	Nurse	1354	1204	88.9
5	None	283	83	29.32
6	None	582	152	26.12
7	None	441	94	21.31
8	None	474	91	19.2
Total	None	1780	420	23.6

Table Showing Degree of Success in the Correction of Physical Defects Attained by Medical Inspectors when Aided by School Nurses, January 15, 1908, to September 30, 1908. Poor People, Mostly Foreign Immigrants. By Miss Anna L. Stanley, Head Nurse, Philadelphia.

Disease.	No. cases referred to six school nurses.	No. treated.	Per cent.
Defective vision	779	452 corrected	58
Enlarged tonsils and adenoids	262	68 operated	26
Poor nutrition	29	28 sent to country and seashore	97
Carious teeth	21	15	81
Defective hearing	29	29	100
Orthopedic defect	9	3	33
Pulmonary disease	7	7	100

School Nurses' Report, Showing Character of Social Work Required to Accomplish Successful Results.

These statistics were compiled by two Philadelphia school nurses, Mrs. Harland and Miss Harris. They refer to 123 children suffering from eye-strain, examined by the writer, and routinely referred to these nurses. Ages 6 to 15 years, mostly Russian Jewish and Italian, practically all dispensary cases.

Total number of children	129	
Total number of children who finally procured glasses	108, or 85%	
Those who procured eye-glasses did so after:—		
Simple advice once given by the medical inspector, and later by the nurse (including 4 cases escorted to dispensary)	16	cases.
Repeated additional advice and urging by the nurse	2	"
One home visit by nurse and urging of parents (including 17 cases escorted to the dispensary)	42	"
More than one home visit required (including 12 cases escorted to the dispensary)	48	"
	108	

PRESENT STATUS OF MEDICAL INSPECTION IN THE UNITED STATES.

In the year 1910 the American School of Hygiene Association endeavored to collect statistics bearing on the work of medical inspection in this country, but, owing to lack of financial resources, transferred the task to the Russell Sage Foundation. The returns from this inquiry have not been fully published, but in the 1911 issue of the Annals of the American Academy of Political and Social Science Dr. Leonard P. Ayres contributes a preliminary report, from which the following figures are taken:—

Out of the 1285 cities in the United States having organized graded schools 758 have reported so far. About 45 per cent., or 337, have some sort of systematized medical inspection. In three-quarters of these the system is controlled by the Board of Education, and in the remainder is under the administration of the Board of Health.

The following table shows the distribution of these cities throughout the five sections of the Union:—

CITIES HAVING MEDICAL INSPECTION.

Division.	Cities reporting.	Cities having medical inspection.
North Atlantic States	308	182
South Atlantic "	45	15
South Central "	67	25
North Central "	286	84
Western "	52	31
United States	758	337

The scope of the work has included inspection by physicians for contagious disease, by physicians for physical defects, the simple testing of the vision and hearing by teachers, and the testing of vision and hearing by physicians. Of these, the practice of testing vision and hearing by teachers is prescribed by law in certain New England States, and the Sage Foundation report shows that 449 cities follow this system. There are also 189 cities, mostly in the northeast and north central States, where testing of the hearing and vision by doctors is provided

for. In 337 cities there is medical inspection either for contagious disease or for physical defects, or for both. Detailed figures for these 3 groups are omitted in the report, the general statement being made that inspection for contagious disease is provided in 301 cities and *systematic physical examination* in only 167 of the cities reporting.

Just as the cities of Massachusetts report examinations by teachers, so does the State of New Jersey show medical inspection in all of the cities reporting. This is not especially to the credit of the cities, but rather are the State authorities to be praised. As a matter of fact, medical inspection in New Jersey is of very recent origin. The law which brought it about, and which may well serve as a model for other States, is here given:—

An Act to amend an act entitled "An Act to establish a thorough and efficient system of free public schools, and to provide for the maintenance, support and management thereof," approved October nineteenth, one thousand nine hundred and three.

Be it enacted by the Senate and General Assembly of the State of New Jersey:—

1. Amend section two hundred and twenty-nine of the Act to which this is an amendment so that it shall read as follows:—

229. Every board of education shall employ a competent physician to be known as the medical inspector and fix his salary and term of office. Every board of education shall adopt rules for the government of the medical inspector, which rules shall be submitted to the State Board of Education for approval.

The medical inspector shall examine every pupil to learn whether any physical defect exists, and keep a record from year to year of the growth and development of such pupil, which record shall be the property of the board of education, and shall be delivered by said medical inspector to his successor in office. Said inspector shall lecture before the teachers at such times as may be designated by the board of education, instructing them concerning the methods employed to detect the first signs of communicable disease and the recognized measures for the promotion of health and the prevention of disease. The board of education may appoint more than one medical inspector. A board of education may exclude from school any child whose presence in the school room shall be certified by the medical inspector as detrimental to the health or cleanliness of the pupils in the school, and shall notify the parents, guardian or other person having control of such child of the reason therefor. If the cause for exclusion is such that it can be remedied, and the parent, guardian or other person having control of

the child excluded as aforesaid shall fail or neglect within a reasonable time to have the cause for such exclusion removed, such parent, guardian or other person shall be proceeded against and, upon conviction, be punishable as a disorderly person.

2. This act shall take effect immediately.

Approved April 13, 1909.

The number of professional men and women employed by these cities includes 1194 physicians, 371 nurses, and 48 dentists. The number of the latter is rapidly increasing. The distribution of the medical inspectors is as follows:—

Division.	Number of doctors.
North Atlantic States	729
South Atlantic "	45
South Central "	31
North Central "	342
Western "	47
United States	1,194

The salaries of the doctors and nurses engaged in the work of medical inspection, according to the Sage report, make a very poor showing. With the exception of 5 cities paying between $500 and $4000 a year, probably for supervisory work, the salaries range from nothing to $1500. A plurality are between $1 and $100, and almost two-thirds are under $300. New York and Philadelphia and probably other large cities are not given in the report. The salary of the 30 school inspectors in Philadelphia is $1400, the assistant chief medical inspector, who is in charge of the work, receiving $2400 and allowance for transportation. In New York City 144 school inspectors receive $1200 each, 10 supervising inspectors $1500 each, 5 borough chiefs about $2000 each, and the director $3000. The schedules of these two cities are far above the average, and yet make a poor showing compared to the pay of the government medical service.

II. HYGIENE.

A. SCHOOL SANITATION.

This should be our rule in the conduct of schools—that we will not injure the health of the children committed to our care. Proper ventilation, yard space, school furniture, lighting, and cleaning should be provided for permanently, before one cent is spent on teachers or curriculum.

At the present time most of our school buildings are designed by third-class architects and ordered by school boards with almost criminal ignorance. Official preliminary test of the hygienic conditions created by the architect and contractor is never made. They receive their money and depart. Afterward there is a passive endurance by the teachers of bad conditions, if they exist, because they are uninstructed in the matter of sanitation, and complaint by them is discouraged because it means expense.

As to our older school buildings, erected thirty years ago, many of them are so dark, dirty, and ill ventilated that they would be closed up by the health authorities if the school came under the factory inspection laws.

The lighting, heating, and ventilating problem has taken an unexpected turn during the last two years by the experimental establishment of fresh-air classes. To a certain extent, this is simply a reaction from the intolerable conditions which have existed hitherto, and practical difficulties will probably prevent the widespread adoption of this new plan. The fact remains that the fresh-air classes are destroying the popular fallacy that fresh air is harmful, and are forcing home to the architects, school boards, and school authorities the principle that money should be expended for air and light, not ventilators and illuminants.

ILLUMINATION OF SCHOOL ROOMS.

The window lighting of school rooms should preferably be from the southeast, since plenty of morning and noon sunlight

is thus afforded, warming and drying the room. A room facing the southwest warms up more slowly and receives but little sunlight until noon. Westerly winds which prevail in fair weather are liable to blow dust into any room with a western exposure. Such a room therefore is not as desirable as the one facing southeast. A northern exposure prevents the entrance of sunlight, and therefore is not as healthful as a southern exposure. Almost always such a window facing makes too dark a room, and it is therefore not desirable except for special rooms to be used by men whose professional work requires a diffused light.

A direct southern exposure is often criticized as inducive of too intense light, and in the summer, of too intense heat. In view of the germ-destroying and invigorating qualities of sunlight, however, it would seem reasonable to provide air space, non-conducting southern walls, with windows provided with shades rolling both from the top and the bottom. To increase the illumination of a room several methods may be thought of. The ceiling and walls may be painted a light color (white ceiling and buff walls). In case the room is a dark one any outside walls near the window and visible from it may be painted white in order to secure reflected light. The windows should be kept clean. A great increase in the illumination may be secured by the use of glass window prisms, which are too well known to require description. Failing with these measures, the wall should be cut out and additional window space provided. In these days of structural iron work, this is a simple task. All the foregoing may appear elementary to the average readers, but it may stir up some teacher stationed in a dreary, antique school building to secure much-needed reforms.

The proper relation of the seats to the windows is fortunately well known to teachers. The light should enter from windows to the left of the pupil. Additional light from the rear is permissible if it is not too strong. Dulled window glass and plenty of window in the rear is a good combination. Light from the right may be allowed only as extra light, obtainable in no other way, because lights and shadows are generally destroyed and children on the right side of the room shadow their handwriting as they work. Light in front should not be permitted.

The eyes are light struck, and objects cannot be clearly seen because of the glare.

Artificial lighting should be by diffused light, preferably produced by concealed electric lights whose rays are reflected downward and diffused from a white ceiling. A large globe around a light is beneficial, since it diffuses the light, although part of the light is lost by absorption. If electric lights cannot be obtained, the choice is between gas and oil. Of these, gas is the less healthful, because it produces the more poisonous gases of combustion. The use of oil in large school buildings, however, is prohibitive on account of the fire risk. Fortunately such large buildings always possess gas or electric equipment.

VENTILATION.

Ventilation is the process of venting or letting out impure air and supplying fresh air in its place. We may consider:—

1. The composition of pure, fresh air.
2. Sources of atmospheric pollution.
3. Requisites for proper ventilation.
4. The three principal systems of school-room ventilation.

The Composition of Pure, Fresh Air.

The composition of pure, fresh air is 78 per cent. nitrogen, 21 per cent. oxygen, 0.04 per cent. carbonic acid gas, and a small amount of water vapor. The latter, as we shall see, varies with the temperature of the air, but roughly may be set down as 0.01 per cent.

The physical properties of air include its temperature and its relative humidity. Possibly there is also some relation of the molecules to each other which is changed by extreme heating of the air making it "lifeless" and less invigorating.

The temperature of the air, of course, varies with the climatic changes, ranging from 0° to 95° F. in the middle sections of the United States.

It is most important to remember that ordinary air as it becomes warmer takes up great quantities of moisture. Hence the fogs rise from the mountains under the influence of the morning sun. Conversely, the air as it becomes colder is not

able to carry its water vapor and the evening dew is precipitated. A glass of ice water chills the air around it and causes the precipitation by condensation of water on the glass. In all these 3 cases the saturation point (on which the relative humidity is based) has changed with the change in temperature. It can therefore be seen that the chilled air which has been forced to throw down moisture has a low saturation point. Fifty per cent. relative humidity or half saturation point in its case would signify very little contained moisture compared with 50 per cent. relative humidity or half saturation in its previous warm condition. Mr. D. D. Kimball[1] writes that if air at zero temperature and 50 per cent. relative humidity is warmed to 70 degrees, without the addition of water, the relative humidity drops to 3 per cent. Such air is far drier than that of the driest desert, and is capable of taking up great quantities of water.

The relative humidity of outside air varies from 50 per cent. to 80 per cent. In the driest desert it seldom gets as low as 30 per cent. Rainstorms carry it above 80 per cent. During fogs and during the precipitation of dew the air is saturated with water vapor and the relative humidity is, therefore, 100 per cent.

In natural air the relative humidity is kept about the same (50 to 80 per cent.) by the *gradual* warming and cooling of the air, thus giving it time to take up or discard moisture without atmospheric disturbance other than rains, dews, and fogs. The failure of our engineers to *rapidly add water* to the air *which they are rapidly heating,* we will presently see to be one of the great faults of our ventilating systems. The air may be pure in chemical composition and still be too dry.

Sources of Atmospheric Pollution.

The composition of exhaled air is 79.6 per cent. nitrogen, 16 per cent. oxygen, 4.4 per cent. carbon dioxide, considerable water vapor, and a very small amount of poisonous organic substances. It will be noticed that the oxygen is decreased one-fifth and the carbon dioxide increased one hundred times by

[1] Annals of American Academy of Political and Social Sciences, March, 1911.

inhalation. It is not, therefore, the decrease in oxygen that unfits the air for breathing. It is the increase in carbon dioxide and, even more, the presence of the poisonous organic substances thrown off by the tissues. For we know now that the carbon dioxide is the milder of the two poisonous factors, since the air of an ill-ventilated room becomes poisonous when the proportion of carbon dioxide in the air reaches 0.4 per cent., an amount not sufficient in itself to be injurious.

The carbon dioxide, which is measurable, is taken as the index to the purity of the air.

The atmosphere of a room is polluted not only by the exhalations of the lungs, but by those of the skin. In the case of unclean children school-room air is odorously contaminated by a variety of substances on their persons and clothing. The "invisible perspiration" of the skin, which is constantly exhaled, consists of small but definite quantities of carbon dioxide and poisonous organic impurities. The free sweat produced by exertion consists principally of water, urea, and sodium chloride. It can hardly be classed as poisonous. Air containing excrementitious substances is intensely poisonous. If one were to breathe exhaled air and nothing else, he would die in a few moments. The foul air of poorly ventilated rooms, of course, does not approach this, except in such extreme instances as that of the notorious "Black Hole of Calcutta" and the cases occasionally recorded in the newspapers of people accidentally imprisoned in bank vaults and closets.

A third source of pollution of school-room air is dust and dirt. These come in on the children's clothing, and dust is also blown in through open doors and windows. Aside from the bacteria found in dust, the latter is also an irritant to the mucous membrane of the nose, throat, and lungs, causing catarrh. This is particularly true if the dusty air is hot and dry.

Finally, we may mention the pollution of air by bacteria. Luckily, most of the 44,655 germs inhaled every hour[1] by the pupil in the school room are not virulent, but diphtheria and tubercle bacilli, together with streptococci, happen along and

[1] Ignatieff, Moscow, 1888. Doubtless these were old-style, insanitary schools.

occasionally obtain a lodgment. Many studies of the number of bacteria in school-room air have been made and are worth noting. Thus, the number of bacteria increases hour by hour during the day; temporarily increases coincidently with assemblies, dismissals, and other activities which stir up the dust; is greater in old-fashioned, window-ventilated rooms (the windows probably being shut tight) than in the modern, artificially ventilated rooms; in dirty rooms than in clean rooms, and is remarkably greater among young children (who are more unclean) than among older ones.[1]

The effect upon children of air laden with bacteria depends, of course, upon the kind of bacteria, the other qualities of the air at the time, and the physical condition of the children. That the air constitutes the principal means of transmission of actively contagious diseases is well known.

Requisites for Good Ventilation.

Good ventilation is secured by removing the air polluted by human exhalations, combustion gases, dust, and bacteria, and replacing it by a supply of pure air of moderate temperature and natural relative humidity. That the first is necessary is evident to all. That the fresh air supplied should have certain characteristics is a matter of general ignorance. We have already seen that natural air keeps at about the same relative humidity. The great fault in our ventilating systems is the lowering of this relative humidity by heating the air without adding moisture to it. Thus, the cellar furnace and the blower system furnish dry, hot air, sometimes devitalized by contact with heated metal radiators. This may be chemically pure, but is physically unfit for human use.

Dry, hot air is a mental excitant and irritant. It also parches the membranes of the eye, nose, throat, and lungs, producing catarrh and inviting infectious disease.

The great quantity of water required to preserve the relative humidity of air as it is heated by the furnace or radiator

---

[1] The room containing the youngest children showed 167 bacteria per liter of air; that of the highest elementary grade 51 bacteria per liter of air. The intermediate grades showed proportionate numbers.

is not generally appreciated. It is said that 5 gallons of water per hour should be added to the air which is heated and passed into a school room containing 40 children.

The quantity of air which should be supplied is 2000 cubic feet per hour for each pupil. The minimum room space allowable has been estimated at 200 cubic feet for each person. An adult uses 30 cubic inches of air at each inspiration, or 36,000 cubic inches per hour.

A scientific discussion of ventilation has possibly one bad effect upon the average teacher. Bewildered by such terms as "direct," "indirect," "crowd poison," and "relative humidity," she feels that she can no longer trust her nose and her temperature sense. Our school systems should make the teacher think about the quality of the room air as a part of the regular school work, and a complaint of poor ventilation should receive the same attention from the school board that any other complaint receives. An interest in the subject will then be created that will beget understanding, and temperature and humidity will then become simply units of measurement with which to prove a condition already appreciable by any one.

The Ventilating Systems.

At the present time we have three principal systems of school-room ventilation: the old-style furnace-heated, window-ventilated class room; the modern class room warmed by special flues not connected with the principal heating system, and the fresh-air school room.

The school room heated by the stove or furnace is found in our old-style city schools and in small schools everywhere. In all of these except a few sections where wood, oil, or natural gas is used, the fuel is coal. Coal gas produced by overfeeding or underdraughting often finds its way into the heating flue and, even if the air designed for use is brought to the furnace by a special pipe from the outside, the coal gas may come up through the floor over the cellar. Carelessness as to filling the pan for evaporating water produces dry, hot air instead of moist, hot air. Even when put to use, such pans do not produce sufficient room moisture. The exit of the foul air being dependent

entirely upon the thoughtfulness of the teacher, and ofttimes also upon her courage to combat the grumblings of the janitor at "wasting the heat," the air sometimes becomes of such foulness as to produce headache and lethargy in those in the room, and nausea in a newcomer. Plenty of tests have been made to prove the frightful conditions just described. In Kotelmann's book on school hygiene is given a number of such experiments. For instance, Boubnoff and Ignatieff found 6.12 parts per 1000 carbonic acid gas in the Moscow Gymnasium, at the third hour of the morning. Rietschel, in Berlin, reported one school in which the carbonic acid gas rose to 9.7 parts per 1000. Air is "bad" when the ratio is over 1 per 1000.

The windows, upon which the ventilation of the room depends, are seldom supplied with ventilators, and when they are the latter are usually a delusion and a snare. This is evident enough when we see the same little attachments fastened to school-room windows that are used in business offices in which 6 or 7 people only are found. The school room contains at least 40, and many of these unclean. "We have ventilators" does not mean much.

I have reason to write thus, because in six years of daily school visitation, covering 50 different schools, I have been almost nauseated many, many times. Strange to say, the room teachers, like the Italians and Polanders in their tenements, are absolutely unconscious of the odor. Some of them may have such a long-standing catarrh from the endurance of these conditions that they have lost the sense of smell, but certainly not all of them. Nevertheless, any principal will corroborate my statement that foul rooms are characteristic of certain teachers and not of others. I remember one teacher of very good family and home surroundings whose room was so offensive because of absolutely closed windows and dirty fourth-grade children that her principal told me she despaired of mending her ways. Though this teacher suffered from sore throat frequently, she would not recognize the cause. Apparently nothing short of a formal complaint to the central authorities was capable of bettering affairs. Down in the foreign quarter the odor in some of the class rooms is a positive stench, and I can mention two Philadelphia schools where the odor begins in the

corridor. Here the fault is not altogether with the teachers unless drastic ventilation measures are prescribed as a positive duty. One boy was asked, "When do you wash?" "Don't never wash—ketch cold," he replied. Among the Italians it is a common practice to "sew up the children" for the winter.

Furthermore, if first-floor rooms are window ventilated, the teachers are frequently unable to make themselves heard on account of the street noises. Study under such conditions is impossible.

The only proper course under these disadvantageous conditions is to institute a system of wide-open-window-ventilating ("blowing out the room") for five minutes every half-hour during the long study periods, and also at the recess period. During the five-minute periods the children are to be given recreation drills (see Physical Education). The hot, dry, foul air exchanged for cool, moist, pure air, the windows may be closed for ten minutes to avoid draughts. Cold air will not harm children who have been lightly exercised, so long as there is no draught. A former high school professor, now at Lehigh University, delighted his classes by what were considered his eccentricities. Every time they reported to him for study he was found with his room windows wide open, rubbing his hands, walking up and down, and smiling at the exaggerated shivers and *sotto voce* remarks of the boys. At our class reunions he is now recalled to mind particularly by this practice, which taught the boys something even more valuable than his excellent instruction in history.

The modern method of ventilation provides fresh air which is propelled by a blower fan through flues into the rooms, and removes the vitiated air by exit flues. The incoming air is warmed over radiators in a special compartment before reaching the class rooms. In this compartment it is (or should be) humidified by the admixture of live steam. Sprinkling or evaporating devices do not make vapor nearly fast enough to supply the necessary quantity, which, at a moderate estimate, amounts to several gallons per hour for a large school building. Ordinary steam radiators in the class rooms supply extra heat when the preliminary warming of the fresh air is not sufficient.

To the mind of the writer we have in this system a good

one, albeit one still imperfect in its practical workings. Because these imperfections are easily remedied with the expenditure of a little more brains and money, and because we will get them remedied quicker if we are alive to them and complain about them, they are well worth mentioning. Briefly, dry air, draughts, and temperature variations due to building construction and to the seasons of year are the principal faults.

With a view to investigating conditions at first hand, the writer recently visited a large elementary school just built at a cost of $300,000; it is one of the finest of its kind. In the basement two 25-horsepower boilers supply steam for the radiators in the class rooms and for those radiators in the large basement compartment in which the air intaken for ventilation is warmed. This air is pure and free from dust, because the intake is up on the roof. Thermostats and thermometers are in every class room. The rooms are large, measuring about 24 by 33 by 14½ feet. The air entrance in each room is a large, square hole near the ceiling, the air flowing from here to the window panes on the other side of the room, where it (theoretically) falls to the low level and then sweeps back across the room to the exit flue. The latter is situated on the floor level, below and a little to one side of the intake flue.

The atmospheric conditions in this school were found to be far from good. In the four rooms investigated the thermometers stood at 71°, 75°, 72°, and 71°. It was evident that the air received by the children in the central part of the room was warmer than that in the corners of the room which were out of the current. In the warmest place in the warmest room the temperature was probably close to 80°. The air was dry, lacking "freshness," and reminding one of a bakehouse. There was no bad odor.

I asked the teachers how they found the ventilating system to work. All replied that it was not very good. They did not speak strongly about it, seeming to take the view that it might be worse and, since the building represented the best of everything, doubtless this was the best obtainable. One teacher had lowered the top window sashes about two inches, a quasi-crime, because it disturbed the working of the room system and, fractionally, the whole system.

Three days later I visited this school again and made a second inspection of the same rooms. In the first the air was evidently fresh and invigorating. I found the thermometer to register 65°. Remarking to the teacher that things were better than before, she replied that she had just lowered the windows for five minutes, and given the class "a little drill" to keep them warm meanwhile. The second class room visited showed a temperature of 68°; the windows were down a trifle from the top. These teachers had evidently imbibed initiative from seditious remarks made on the first visit, and had started out to be comfortable and hygienic. The principal opened her office window and stood for a moment breathing and enjoying the clear, cold March air. "Doesn't it smell fresh!" she said.

Writers on ventilation also mention the poor regulation of temperature under the modern system. A warm day succeeds a cold day, and, in spite of the thermostats, the rooms somehow become very hot and close. Possibly the excess heat comes in from the basement by way of the corridors or arises from the steam radiators. The rules, however, prescribe that the windows are not to be opened unless some one faints, and thereby justifies extraordinary procedures. Another possible source of trouble is the raising of the temperature in one part of the building by the excess heat created from shutting it off in another part.

Fresh-air Classes.—Now we come to the revolutionary method of free ventilation by open windows, which means the use of absolutely fresh air at the prevailing outdoor temperature. Half-smothered teachers longing for fresh air have been encouraged by the success of the open-air treatment for tuberculosis, pneumonia, and general debility to assert themselves. The experiment is being tried in several cities, and its leading exponent is William E. Watt, Ph.D., Principal of the Graham Public School in Chicago. In "Open-air Crusaders" is told how the experiment of the fresh-air school grew out of the success of the Elizabeth McCormick Open-air School, the latter being really a sanatorium school. A description taken from the book is well worth reading:—

"In September, 1909, two rooms were opened in the Graham School to show what natural cold air will do for normal pupils. No

selection of individuals was made except that as children entered the school for their first year's work they were given their choice of entering a cold room or a warm one. Of course some pains were taken to inform the parents in advance as to what it was expected the cold air would do. After several weeks of trial in which zero weather was encountered and no bad effects followed, teachers, parents, and pupils, seeing what had been done for those in the two rooms, asked for rooms in the other grades for the same sort of work. The school year closed with seven open rooms.

"So satisfactory was the work that the school opened in September, 1910, with twenty cold rooms, merely retaining enough of the warm-air rooms to insure a place in a warm room in every grade for pupils whose parents desired them to have it, and also a place for teachers to work in warm air in case some of them feared that work in a cold room might prove too strenuous. The Board of Education also constructed two canvas-sided rooms on a roof of the Graham School to give the matter a more definite trial and to gather the results of the work of normal pupils in open air. The rooms may be duplicated anywhere for $600 each. They were completed too late in the spring for any tests to be made in them.

Fig. 49.—Fresh-air class in wooden pavilion. (Courtesy of Dr. Thomas Spees Carrington.)

"The work in a cold room differs from that in a warm room. The pupils are exercised far more frequently, and in the low grades the seats are removed so as to provide wide floor space for games and dancing. Common wooden chairs or kindergarten chairs take the place of seats,

and long tables of simple construction replace the old form of rigid desks. The children sit in the school room clad in the clothing which protects them on the way to school. They keep all that clothing on, if they choose, or lay aside their caps, mittens, overshoes, and coats if they feel uncomfortable with them on. During the year no money was paid out for any sort of clothing to protect the children from cold, as it was found that whatever clothing would bring them safely to school was more than enough for protection in the school where games were frequent. In one instance when the weather outside was about zero, the principal went into a room to see whether he could find any children

Fig. 50.—Fresh-air class on porch. (Courtesy of Dr. Thomas Spees Carrington.)

who ought to be given warmer quarters. He found six boys with their overcoats off. As he approached them without saying anything about his intentions, he was met by the stout assertion of one of them who had read his mind: 'No, Mr. Watts, we don't want 'em. We're not cold.'

"Of course the weather outside is much rougher than it can be in the school room, for we do not permit boisterous winds to enter, and some heat will get in from the corridors no matter how careful one is to exclude it. At all times we had places where the children might go to warm themselves if they chose. But such places were not used except by three or four from a room, and by them not four times each during the entire winter.

"As the school is a public one and public opinion has to be cared for, arrangements have been perfected for the year 1910-1911 to provide

a current of warmed humidified outdoor air for each room so as to reduce the rigor of wintry weather and give the room a temperature of between 40° and 50° in winter, preventing it from going so low as to alarm anyone. While it is the opinion of the principal that such air is not so good for the children as unwarmed air, he has conceded a point to doubters, and has it understood that a cold room is somewhat warmed and is not so severe as outdoor air. He believes the time will

Fig. 51.—Fresh-air class room with glass sashes open. (Courtesy of Dr. Thomas Spees Carrington.)

come when parents will demand what many in the neighborhood of the Graham School desire: air for school without any heat at all supplied, even in the most severe weather, but warming rooms provided for emergencies.

"Teachers in cold-air rooms close their day's work feeling fresh and well. Those in hot, dry rooms close the day often in a state of collapse. Children taught in fresh air learn with avidity and directly. They do not require the perpetual reviews and drills so common in our hot, dry schools. They are happier and grow more rapidly in cold air. The discipline of a school is reduced to a simple problem when the air is right. Merely humidifying the air in the Graham School and lower-

ing the temperature of all rooms from seven to ten degrees lowered the number of cases of office discipline 80 per cent. It removed the sources of ordinary friction between pupils and between them and their teachers.

"After eight weeks of cold-air work in the two rooms first opened for the demonstration, the school physician found that the nasal discharge, which is very common in all primary schools in cold weather, was entirely absent in the two rooms open to the fresh air. One child with catarrh was found in each room, but both had been out of school

Fig. 52.—Wall torn out to make fresh-air class room. (Courtesy of Dr. Thomas Spees Carrington.)

and returned the day of the inspection. He found in two similar rooms where the air breathed was like that supplied in the very best schools of Chicago and other progressive cities that over 40 per cent. of the pupils had nasal discharge, although his examination was held before the severest weather had been experienced.

"Some of the most common objections urged by those who inquire about the Graham School are, that the child's eyes are hurt by the light of an open-air room, and that it is impossible to do the written work required in school if we have the air cold. It is quite as easy to protect the eyes in the open-air room as in the ordinary room. Common sense takes care of that. But the objectors do not seem to realize that the

deadly hot, dry air of the ordinary school assails the eyes grievously, and much of our eye trouble comes from living in air which causes a rapid evaporation of mucous secretions and causes the eyes to dry up and smart so that disease finds a ready entrance in the weakened organ. More eyes are destroyed, probably, by hot, dry air, such as is common in schools in cold weather, than could be destroyed by the most foolish

Fig. 53.—Fresh-air class room. (Courtesy of Dr. Thomas Spees Carrington.)

use of all the light available in an open room in this climate, where the winter sunlight is not particularly trying.

"Those who fear that the written work of the schools must suffer because children in mittens cannot use the pen find relief when they see that the pen is not used at all in the first grade, where the greatest number of children are. It is used very little in the second grade. But the cold-air work does not seriously hinder the children in using pens. The ink has never frozen in one of our open-air school rooms. The plants in the kindergarten, the only open-air kindergarten in the world last year, did not get a touch of frost during the winter. This shows that the room was not very frigid. It was rare that we could get the tempera-

Fig. 54.—Porch used for fresh-air class room. (Courtesy of Dr. Thomas Spees Carrington.)

Fig. 55.—Wall torn out to make fresh-air class room. (Courtesy

ture low enough to make it worth while to look at the thermometer for a record. The house is warm, the corridors throw in heat at every open door, and the bodies of the children are healthy little furnaces supplying a great amount of heat: all contribute to keep the temperature from running down to where it gets in the barn in the country, where children delight to play, no matter what the weather may be."

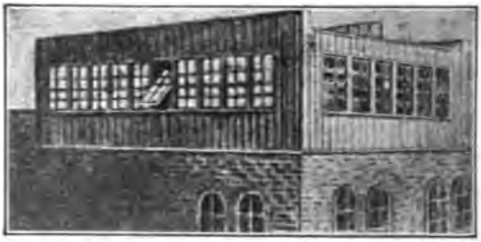


Fig. 56.—Roof used for fresh-air class room.

Dr. Watt has published a book ("Open Air"), in which he gives his experiences and beliefs. It is a live, interesting work, in popular magazine style, with some repetitions and loose statements, but so generally true and so humanly and earnestly written that every teacher in the elementary schools would do well to read it. It will be perceived that Dr. Watt is a gifted teacher as well as a hygienist, and that curriculum improvement and personal enthusiasm have contributed to the success of his venture. It will be interesting to know a year hence whether the Graham School will figure as the pioneer (or, at least, one of them) in a new school hygiene, or whether the demands of the curriculum and a loss of initial interest will discount its results.

To the writer the ideal seems to be the open-air class, except in the coldest months, when the temperature gets down toward the freezing point. One has but to look at the red-faced policeman and coachman, full of red blood resulting from an outdoor position free from worry and hurry, or the husky Italian woman who presides over the sidewalk fruit or news stand to see the wonderful effects of fresh air. Compare these men and women with others who work indoors.

Now, if a child (1) has not previously been warm and damp by exertion, or (2) has not been devitalized and germ-

loaded by a foul, warm atmosphere, or (3) has not wet feet, or (4) has not insufficient clothes, or (5) is not undernourished, fresh air will not hurt him; it will do him good; *he will enjoy it.* His teacher is a harder proposition, because she is often nervous and anemic from school-room confinement, and fearsome of anything cold except ice-cream. One day's trial, however, will convince her that it is only a question of jumping in.

If we adopt the fresh-air class as the routine arrangement, what should be its safeguards and modifications?

Read the "ifs" just mentioned. It is evident that the children of the poor, insufficiently clad, underfed, leaky-shoed, fresh from hot, crowded living rooms, cannot react to the cold outside air for a continuous three-hour period. Would one take in a shivering, lean dog and charitably give him the front doorstep fresh-air cure? It is evident in this case that we must save what heat energy they have, and mitigate the evil effects of cold, wet feet by keeping the temperature moderate—not that I am advocating a warm room, which relaxes the skin circulation and dissipates heat just as alcoholic drink does. But with these poor children the temperature should stay around 60°, and when nature takes it below that we must supply artificially warmed air.

Among the well-fed children of the well-to-do, stoutly clothed and shod, and fresh from good homes, no temperature above freezing will do harm. Here, if parents understand and co-operate in regard to clothing, the fresh-air class may operate most of the school year.

Though not a teacher and writing simply from the standpoint of health, I am bound to confess that there are apparent pedagogical difficulties in the fresh-air class. A certain clumsiness of motion is inevitable with heavy wrappings, and there is difficulty in using the pen or pencil. With the experiment in progress less than a year it is impossible to comment on the general practicability of the whole movement.

Proven results of increased efficiency coming with better ventilation are quoted by Mr. Kimball in his article already mentioned:—

"The reports of the Boston City Hospital show that improved general sanitary conditions in that institution changed the death rate from

44 per cent to 13 per cent. In the general wards of the same hospital the sanitary improvements effected changed the death rate from 23 to 6 per cent., or nearly in the same ratio as in the surgical wards.

"At the S. R. Smith Infirmary, at Staten Island, a comparison was made in two wards of the same nature, containing the same class of patients, in which case it was found that in the ward without ventilation an average of sixteen days was required to effect a cure, while in the ventilated wards the average was ten days. This also means a greater work with the same equipment.

"Examples are available showing the improvements in results and health due to ventilation, but the time element is so important in such investigations that tests are rare and difficult to make.

"Dr. J. N. Hurty, Secretary of the State Board of Health, Indiana, is authority for the statement that, 'In properly heated, ventilated, and lighted school rooms in Richmond, Evansville, and other cities in Indiana, we have secured an efficiency in the pupils of 25 per cent. over what it was under old conditions. How much of this increased efficiency is due to better ventilation we cannot say, but the entire increase must be credited to ventilation, proper lighting and even distribution of heat, and regular temperature. We have found through a system of marking and grading pupils that those who work under the best sanitary conditions will accomplish in three years what they ordinarily accomplish in four.'

"The Germania Insurance Company of New York, in 1910, had eighty clerks in one office. Previous to the proper ventilation thereof, 10 per cent. were absent on account of illness all the while. Since then, absenteeism has been reduced practically to nothing.

"The vice-president of the Manhattan Trust Company of New York states that by proper ventilation he has so increased the efficiency of his clerical force that he has been able to reduce the number of employés 4 per cent.

"The records of the United States Pension Bureau show that when the offices of the department were located in scattered and poorly ventilated buildings 18,736 days were lost by employés through illness in one year and about the same number for several successive years. When the department became established in new, well-ventilated quarters, the loss was reduced to 10,114 days' absence on account of illness, although the working force was much larger.

"In the printing establishment of Mr. C. J. O'Brien, in New York, a ventilation system was installed because of the insistence of the State Department of Labor that the law be complied with, the order having been resisted for two years. After the system had been in use a year the proprietor stated that had he known in advance of the results to be obtained no order would have been necessary to have brought about the installation. Whereas formerly the men had left work on busy days in an exhausted condition and sickness was common, now the men left work on all days in an entirely different condition, and sickness had

been very much reduced. The errors in typesetting and time required for making corrections were greatly reduced.

"Townsend, Grace & Co., of Baltimore, built a straw-hat factory without ventilating apparatus. The first two winters after occupation the sick rate was 27½ per cent. A ventilating system was then installed, after which the winter sick rate fell to 7 per cent. It was claimed that the ventilating system paid for itself in one year.

"In Strouse Brothers' clothing factory, of Baltimore, the sick rate was reduced about one-half by the installation of a ventilating system.

"The army medical officers gave some of the earliest definite data on air quantities required in ventilation work and have furnished many illustrations of the value of ventilation, as has also the naval service. Munson records: 'The medical officer at Fort Douglass, in 1898, reported an immediate decrease in the number of cases of tonsillitis among the troops at that post on installing suitable arrangements in the previously improperly ventilated barracks.'"

PHYSICAL EDUCATION.

Health, like education and morality, is attained by the daily practice of right habits.

Physical education, as distinguished from medical inspection, signifies instruction in healthful exercise rather than the correction of existing defects. The school physician secures the removal of blighting influences. The physical instructor guides the child, *now in condition to be helped,* toward healthful habits. Physical education should be an integral unit in the *school* system, so that instruction, exercise, and training in health matters can be enforced, along with the study of history and mathematics.

The academic work of the school does not suffer because of the introduction of physical education into the curriculum. The beneficial effects of fresh air and exercise upon the mental capacity of the children more than compensate for the time given to it.

There should be a correlation of the work of medical inspection and the work of physical education. The latter presents a system worked out by long experience, and its routine operation calls for no interference by the school physician. It is not intended, however, for debilitated children. Therefore, it is the function of the school physician to detect and exempt from class exercises children with weak hearts and certain other chronic

ailments. It is also proper for the physical instructor and the school physician to work together for the correction of orthopedic defects, particularly stoop shoulders, flat chest, and spinal curvature, which are extremely common. Special classes of these deformed children should be assembled. The school physician should examine them for causative defects; these defects should be treated, and then special gymnastics be given. In Philadelphia a room in the Lyons School has been fitted up as an orthopedic gymnasium, and is operated jointly by the Bureau of Health and the Department of Physical Education (see illustrations). In one of the schools the principal recently volunteered to conduct a "flat-chested class" daily in the corridor if I would look over the children and nominate the cases. This brings out the fact that teachers can help in this really vital matter if they can be interested.

Coming now to the consideration of routine physical education, it may be defined as the regular practice of muscular exercise. The term is synonymous with calisthenics and physical training, but is preferable because it expresses the idea that the subject is systematically *taught*. Gymnastics has the double meaning of physical education and athletics, and, therefore, is a less desirable term.

The aims of physical education are:—

1. *To improve the general health.*

2. *To increase the muscular power (strength).*

3. *To quicken the motor response to stimulation (alertness and agility).*

4. *To improve the motor co-ordination (grace and dexterity).*

5. *To improve the mentality. (Among normal children this improvement is chiefly in emotional discipline, producing better will-power, obedience, exactness, and order. Among mentally deficient children the intellectual processes, which are low, are stimulated also).*

6. *To secure an upright carriage and manly appearance.*

Several systems of physical education are mentioned by writers on the subject. Prominent are the English system, the German system, and the Swedish system of Ling. While it is true that the term "English system" originally conveyed a gen-

eral impression of simple outdoor recreative games rather than formal drills designed to develop certain muscles, the plan of procedure is so similar everywhere today and is derived from so many different sources that the names mentioned have lost their former significance.

The methods of physical education[1] are by:—

1. Formal drills (in the yard, if possible, to avoid floor dust, jarring, and noise).
2. Deep-breathing exercises.
3. Games.

Fig. 57.—Formal drill in class room.

4. Gymnastics, calling for the use of apparatus. These may be practised in the yard or gymnasium. Fixed gymnastic apparatus is not necessary for younger children, but is a stimulus to the interest of older boys.
5. Recreation drills in the class room.

1. *Formal Drills.*—These should be given for fifteen minutes daily. The regular recess time should not be used, since the latter is intended for mental relaxation. In the grades above the first, part of the fifteen minutes mentioned may be assigned to the afternoon. A well-systematized course provides for new

[1] The methods briefly mentioned here are given more fully in the handbooks (graded) of William A. Stecher, Director of Physical Education in the Philadelphia Schools.

lessons every two weeks, the later lessons in many cases being based on the earlier ones.

As has been noted, the drills should be given by preference in the school yard, less desirably in the school corridor, and least so in the class room. Thorough ventilation should be insured in the latter cases. Precision in drill is obtained much more readily if military tactics are observed from the very beginning of the period, namely, when the children are told to rise from their seats. Proper marching and preliminary spacing are really essential. The execution of the different movements, like mili-

Fig. 58.—Formal drill in class room.

tary tactics, is done with a preparatory and an executive command. Thus, "Hands on the hips—place!" Or, if a series of figures is contemplated, "Arms forward—one! two! three!" After various figures are learned, a complete exercise may be taken rhythmically, *i.e.*, *in time*. An examination of the formal drills prescribed for the different grades shows that they are intended to develop the larger muscle groups. Thus, bending the back in each direction and flexion and extension, adduction and abduction, of the limbs are the basic movements.

In the lower grades the exercises are simple in character, and do not call for vigorous exertion. Thus, the head may be lowered and raised; the arms raised backward and lowered; the chest raised and lowered; the arms folded behind, and one leg raised backward at a time and lowered.

In the upper grades the movements are more complex and more energetic. The positions assumed are often rather extreme, and a repetition calls for a certain amount of endurance. Thus, in a single exercise, the hands are clinched, the arms swung fore-upward, and a stride made left-forward. The trunk is then bent to the left and the hands placed behind the neck. The movements are reversed until the pupil returns to the primary position.

2. *Breathing Exercises.*—Exercises in deep breathing are

Fig. 59.—Formal drill in class room.

so important that special mention should be made of them apart from other formal drills. It is true that any vigorous exercise will induce deep breathing, but a specific one for this purpose insures it, and at the same time may be made an occasion for impressing the child with the importance of deep breathing.

The fundamental things to be remembered in conducting breathing exercises are: (1) The shoulders should be squared, but this does not increase the lung capacity. (2) The mouth should be closed during the exercise. A child unable to do this should be referred to the school physician. Breathing exercises should raise the walls of the chest and push down the diaphragm, but it should be kept in mind that raising the chest walls without depressing the diaphragm is not a breathing exercise.

In or out of school, at any time in life, a breathing exercise lasting three minutes and consisting of 20 slow, vigorous inspirations and expirations, performed three times a day, meets the usual requirements.

3. *Games.*—Games may be purely recreative, or both recreative and competitive. Of the many that may be mentioned a few are: Cat and Mouse, What are You Doing in My Garden? Hand Tag, Follow the Leader, Beanbags, and Boundball. Among the older children Potato Races, Fox and Chickens, Pass the Beanbag, and Lame Duck are popular. For the seventh and eighth grade pupils Relay Races, Prisoners' Base, Three Deep, Dodge Ball, Volley Ball, and Medicine Ball may be mentioned.

Fig. 60.—Formal drill in class room.

In addition to games in the yard, exercises in hopping and jumping may be indulged in. These call for the vigorous use of the leg muscles, while, at the same time, the idea of exercise is subordinated to that of play. The hopping exercises may be done with both feet on the ground, or one only. As an example of the first may be given: Hop to a side stride, 1; crossed legs, 2; side stride, 3; position, 4. Jumping exercises (in which the knees are bent) may be done from both feet, or one. The pupil may jump upward, forward, or backward. Following is an exercise involving jumping upward from both feet:—

1, raise the arms forward and raise the heels; 2, swing the arms down and backward, bending the knees; 3, swing the arms fore-upward, jumping upward; 4, swing the arms down and backward, bending the knees; 5, straighten the legs, lower the heels and arms. (The fourth count immediately follows the third.)

The jumping and hopping exercises may be combined, and quarter and half turns introduced for greater variety.

4. *Gymnastic Games.*—Gymnastic games, involving the use of apparatus, may be either (1) light games in which skipping ropes, beanbags, quoits, basketball, or rubber balls are used or (2) recreative games for young children requiring fixed apparatus, such as giant strides and seat swings, and (3) games and exercises on heavy gymnastic apparatus. A list taken from Stecher's "Handbook of Lessons in Physical Training and Games" is here given:—

PLAY APPARATUS FOR SCHOOL YARDS.

For Boys and Girls.

Giant strides,
Horizontal ladders,
Seat swings,
Teeter boards,
Tether balls,
Standards for high jumping,
Sandpits for broad jumping,
Rubber quoits,
A few basketballs,
A few footballs,
Playground baseballs and bats,
Medicine ball,
Hurlball (with a handle).

For Boys.

A low horizontal bar,
A pole-vaulting set,
A few low hurdles.

For Girls.

A few long jumping ropes,
Several dozen short jumping ropes,
Several dozen beanbags,
A few bagboards,
Several dozen grace hoops,
A few soft-rubber balls.

5. *Recreation Drills.*—The recreation drill is simply vigorous exercise for about five minutes, led by the grade teacher, and should be given twice in the course of the morning while the room is being thoroughly aired. Too much attention should not be paid to details, as the principal object is to relax cramped muscles, stir up the circulation, and relieve nervous tension. An example of a recreation drill is given below:—

1. *Hands clinch;* swing the arms fore-upward and lower them side-downward, pressing them back as far as possible, 8 to 16 times.

2. *Hands on hips, place;* continuously bend the trunk forward and backward (a swinging movement) 8 to 10 times.

3. *Raise the arms sideward and hands clinch;* turn the trunk left and right, as a continuous movement, 8 to 12 times.

4. *Raise the arms upward and left forward stride;* swing the arms forward and upward, at the same time bending the trunk forward and backward, 8 to 10 times.

Fig. 61.—Formal drill in corridor.

SCHOOL FURNITURE.

In considering the question of school furniture we should bear in mind that any seat is injurious if used by a child for many hours continuously. The discussion of what constitutes a good seat is entirely secondary to this point. The muscles of the back are under a constant strain while the body is erect, and fatigue is avoided only by the alternate use of different sets of muscles. A fixed position means the prolonged use of one set and consequent fatigue. Any person who has lain upon his back for several days after a surgical operation will testify to the severe backache due to inability to change his position. In the case of the child such immobility is not required, and fatigue causes the relaxation of the tired muscles, with con-

sequent collapse and slouching of the body. In this way do long school hours without recess periods produce flat-chested, stoop-shouldered children.

Possibly the day may come when the school room will be transformed into a more homelike place, and divers chairs, desks, and tables will afford pleasing and healthful variety. With present conditions of 40 or more children in a room, school furniture of a conventional type is necessary.

A seat which is too low pushes up the knees. This causes a cramped attitude injurious to respiration, to the functioning

Fig. 62.—Formal drills, illustrating different movements.

of the abdominal organs, and to the development of a normal, straight back. If the desk be too high in proportion to the seat, a shoulder hunch results when the elbows are rested on it. Usually the right elbow alone is hooked up over the desk in writing, and a lateral curvature results. If the desk be too low and far in front of the seat, the occupant will either bend over or, perchance, slip down in a sprawling position, using the edge of the desk for a bookrest. If the seat is too high, so that the feet swing, the pressure on the large veins under the thigh is injurious. Children so lifted from the floor frequently slide forward until the heels rest on the floor with the limbs straight extended.

At the present day the proper proportions and measurements of school desks and seats have been so accurately deter-

mined that modern school furniture should come to the teacher with little for her to do, except adjust it to the needs of the individuals of her class. It is an unfortunate fact, however, that the majority of desks in use are not adjustable, and very

Fig. 63.—Recreation games and exercises in yard.

often an entire shipment is of a size unsuited to the grade receiving it. Two and even three sizes are found not to accommodate a majority of the children in a grade, yet but one size is frequent in a class room. In view of these facts it is well to review the standard rules which determine whether or not the desk and seat are suited to their occupant.

Fig. 64.—Recreation games and exercises in yard.

Fig. 65.—Recreation games and exercises in yard.

Fig. 66.—Recess, illustrating free play by the children. (Courtesy of Mr. W. A. Stecher.)

The seat should be of such a height that the feet rest easily upon the floor.. Its depth should be about two-thirds the length of the thigh. The seat should have a downward curve toward the back of three-eighths of an inch. The back should have a backward and upward slope of about 1 in 12, conforming in

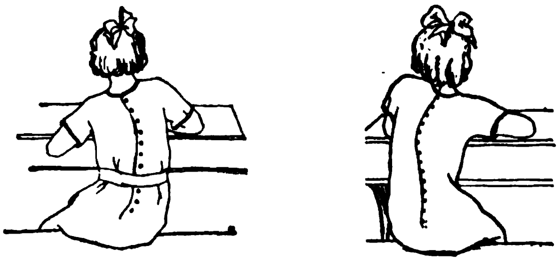


Fig. 67.—Desk too high.

its curves to the natural shape of the spine, and especially giving a firm support to the lumbar region of the back. Of the seat backs, some offer support in the dorsal, others in the lumbar, and others in the pelvic region. The Boston School House

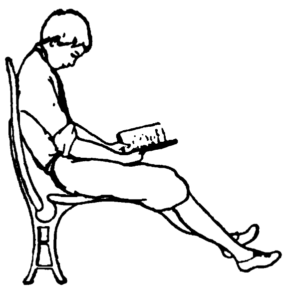


Fig. 68.—Seat too low. No book rest.

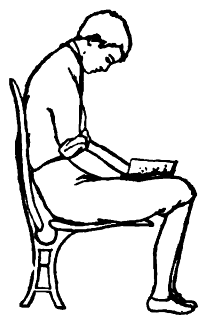


Fig. 69.—No book rest. Faulty position.

Commission and Dr. F. J. Cotton, of the Boston Children's Hospital, have suggested a seat back which presses against the back in the lumbar region, in order to prevent bowing at this region. Twenty-two thousand of these desks and seats (Lovett, 1908) are in use in Boston. Dr. Cotton, writing in the *American Physical Education Review*, December, 1904, says:—

Fig. 70.—Illustrating normal and faulty sitting positions. Note the difference in position of each row. The children are posing by request.

"The model finally settled on consists of a curved support of wood 9¾ inches wide and 5 inches high, with a concavity of 1 inch in depth from side to side, with a convexity of 1 inch in profile, the whole very slightly tilted backward. The maximum convexity lies one-third the way up, and, when properly adjusted, comes about opposite, or a little above, the fourth lumbar vertebra. This support is carried on a light casting running in the groove of a single cast-iron upright attached to the back of the seat. A setscrew fixes the height after adjustment.

"Seats have been manufactured from these models in two sizes, and are used with the adjustable desk and seat castings that provide for height adjustment. As the matter stands, the new furniture provides a seat adjustable for height, with the new back rest also adjustable for height, and a desk likewise provided with a vertical adjustment."[1]

This chair back is so arranged that not only does it support the back in the erect sitting position, but in the writing position the lower edge of the chair back touches and steadies the upper part of the pelvis, tending to prevent twisting in this position.

Dr. Schwatt, in the article quoted elsewhere, advocates the seat giving the dorsal support, qualifying the suggestion by the stipulation that the seat must fit the curves of the back. It would seem that a seat that fits the curves of the back is one designed to offer uniform support to the whole back rather than local support in one region. His article, which is an excellent one, is based largely on German authorities.

The desk should be of such height as to allow the arm to rest on it naturally when the elbow is at the side. The top should have a slope of 15 degrees to bring the book more nearly at right angles to the line of vision, and to give an easier position in writing. A greater slope would be better, but is impracticable.

The relation of seat to desk is important.

If a line dropped from the edge of the desk falls in front of the front edge of the seat, the clearance "distance" is said to be plus; if behind it, minus. A slightly minus "distance" is preferable if the seat be large enough. It is seldom found, however, as it interferes with free rising and does not give room to stand between the seat and desk, unless the desk top or seat can be raised.

The "difference" in height between the rear edge of the desk and the seat is determined when the height of the desk is

[1] Reports of Boston School House Commission, 1901-1905.

determined. This has already been mentioned. In practice the difference is often greater than it should be, because the lower shelf otherwise interferes with the pupil's knees.

It should never be forgotten that school furniture should be fitted to the dimensions of the child, not to his age.

Mr. William A. Stecher, Director of Physical Education in the schools of Philadelphia, has demonstrated this fact by an investigation of the leg-length and elbow-height (sitting) of 5000 school children.[1] He found first that the height of the seat (leg-length) and the height of the desk (elbow-height) do not bear a fixed relation to each other. Thus, the children with a leg-length of 16 inches showed elbow-heights ranging from 21 to 28 inches, three-fourths being 23, 24, and 25 inches. He found, secondly, that children of numerous sizes were in each grade, and, conversely, that the children of any one size were scattered through numerous grades. Thus, the children whose leg-length was 16 inches were found in all the grades from 2B to 8B inclusive. For this reason we almost hesitate to quote the figures given below for fear some undersized or overgrown boy will suffer in consequence. However, we give them to sustain some teacher who has been presented with a roomful of non-adjustable desks unsuited to the average age of her pupils:—

Average Desk and Seat Measurements for Different Ages.

Ages.	Width of Seat.	Difference.	Distance.	
			Seat Down.	Seat Raised.
6 to 8	25 cm.	24 cm.	—5 cm.	+7 cm.
8 to 10	26 cm.	27 cm.	—5½ cm.	+10½ cm.
10 to 12	29 cm.	28 cm.	—6 cm.	+11 cm.
12 to 14	29 cm.	30 cm.	—6 cm.	+13 cm.

In the article already referred to, Mr. Stecher advocates non-adjustable desks of three sizes in every room, plus some adjustable desks. The sizes of the non-adjustable desks depend upon the school grade, and the suggested proportionate number of each of them and of the adjustable desks is given in the following table, based upon his investigation and measurements:—

[1] Proceedings American School Hygiene Association, 1911.

The Percentage of Desk Sizes for Each Full Grade.

Desk No. 1 is largest; Desk No. 6 is smallest.

No. of Desk	1st Grade. Per Ct.	2d Grade. Per Ct.	3d Grade Per Ct.	4th Grade. Per Ct.	5th Grade. Per Ct.	6th Grade. Per Ct.	7th Grade. Per Ct.	8th Grade. Per Ct.	Measurement in inches. Leg.	Elbow.
No. 6	22.5	....	....	....	....	....	....	....	10	18
No. 5	43.5	26.5	....	....	....	....	....	....	11	19
No. 4	22.5	42	33.5	16.5	....	....	....	....	12	21
No. 3	....	16	42.5	51.5	39	30	18	10	14	23.
No. 2	....	....	10.5	20.5	45	48	54	54	16	25
No. 1	....	....	....	....	7	12.5	19.5	21.5	18	27
Adjust	11.5	15.	11.5	11.5	9	12.5	6.5	14.5		

Hygienic school furniture consists either of adjustable desks or, at least, of three sizes of the non-adjustable form. At the present time we have arrived at the stage where we are buying adjustable desks, owing largely to the greater profit to the manufacturer. The Russell Sage Foundation has just published the results of an inquiry which shows that 47 per cent. of American cities have adjustable desks (this may mean one desk or more). The condition in the country districts is not stated. Since many of these rural schools are supplied with the cast-off furniture of the towns, the proportion of adjustable desks must here be low.

Having purchased adjustable desks, we do not adjust them; in fact, do not know how. The Sage Foundation investigation notes that of 321 cities having adjustable desks 37 adjusted them at intervals varying from daily to yearly. Since there was only 1 that reported daily adjustment, this remarkable state of affairs may be ignored. Of the remaining cities 283 reported that the desks are adjusted "as needed." We all know what that means. One frankly reported that the desks were never adjusted.

Last summer two teachers at the University of Pennsylvania Summer School asked the writer to show them how to manipulate the desks, as they did not know how to adjust them. It may be acknowledged that a desk which can only be adjusted with the aid of the janitor and a monkey wrench is of practically no use. It reminds one of a fire-escape with the door locked. What we need is a desk of such type that a child can adjust it, and

instruction in the matter so that it is a live subject with the children.

One day, in visiting a second-grade class room in the Hancock School in Philadelphia, my attention was attracted to a large colored boy who was seated upon a small kindergarten chair writing, with his paper placed on an ordinary wooden chair. What with the obstruction to his legs offered by the rounds of the chair, and the doubling up of his body as he reached forward to write, he was a remarkable spectacle. Pass-

Fig. 71.—Too large for her desk.

ing into the next room, with this case in mind I glanced around and saw, among the small girls, a large one jammed into a desk several sizes too small for her. The accompanying illustration shows this girl standing against the wall of the room with one of the other children beside her for purpose of contrast.

COMMON SOURCES OF DIRECT CONTAGION.

Drinking Cups.

The common drinking cup has been practically abolished in city schools. In its place is found the fountain, to which the lips are applied direct without fear of contamination, or there is the ordinary hydrant, unsupplied with cup, from which

the child may extract water as best he can. Unfortunately, the grimy hand of a small boy is scarcely a sanitary receptacle. Paper cups are on the market, but the question of expense enters in as well as the nuisance of the discarded cups. Theoretically, the possession by each child of his own cup is a proper arrangement, but it is the testimony of teachers that the cup often lies around the pupil's desk in anything but an inviting condition, and is used without preliminary washing.

The Common Pencil.

The practice of distributing and collecting pencils among the children means that germs are transferred from one mouth to another by as perfect a method as could be devised.

PHYSICALLY DEFECTIVE CHILDREN IN THE CLASS ROOM.

Thousands of children with physical defects of minor degree, incurable in character, are found in our regular class rooms. Chief among these are those suffering from defective vision and hearing. The teacher who has already co-operated with the medical inspector in the detection and correction of physical defects will place such children in the front part of the room, where the blackboard is visible and she may be heard. Furthermore, she should have a definite system of medical inspection records whereby the necessity for such action in the case of any child shall be made known to every teacher handling him.

SCHOOL WORK AND RECREATION.

Whole books have been written about this important subject. We know that efficiency decreases after the third hour of the school day; that prolonged periods of study cause nervous exhaustion, spinal deformities, and a low standard of school work. Without unduly injecting pedagogy into the discussion, we are learning also that the present school curriculum is unfitted to the mental capacity and age of the child, often retarding his natural development.

In order to help these conditions we need, first of all, to impress upon every teacher that a bright, alert child can learn

more in ten minutes than a tired, apathetic child in an hour. The teacher who boldly takes out five minutes' time every half-hour for recreation drill with the windows open puts her children in the same condition as ground which has been properly prepared by the farmer to grow the seed planted in it.

In this way fights between the teacher and the children are practically abolished, because the nerves of each are quiet. The proper system provides a five-minute recess at 10 o'clock, which follows a good, solid hour devoted to some subject requiring concentration, such as mathematics; a second relaxation period, which is the long recess, from 10.45 or 10.40 to 11, and a third short period devoted to a recreation drill at 11.30. In the afternoon a five-minute recreation drill should be given about thirty-five minutes after the opening of the session, and a ten-minute recess about an hour and a quarter after opening, during which, of course, the room should be aired, provides relaxation of nervous tension, and an opportunity to use the toilet.

Concerning the afternoon session, every teacher knows that children at this time are not good for much work. High school and college professors maneuver for morning hours. For this reason it appears that little children get practically nothing in knowledge, and, tiring, become stoop-shouldered. Of course, we may continue into the afternoon as a day-nursery feature, but in such case we may just as well play games and exercise the children. I have often thought that, in view of the complaints of principals and medical inspectors that their clerical work overwhelms them, and also in view of the half-baked mental condition of beginning teachers, a good system would be to place the inexperienced teachers in the first grades and utilize a part of their time for clerical work, leaving them free certain afternoons in the week, also, to go back and take work in college branches, now prematurely foisted upon them in their undergraduate days at the normal school. In the afternoon the first-grade children could be put in charge of half the number of teachers, who should supervise their activities in the school yard when possible. Afternoon attendance by first-grade pupils should be entirely optional, the work being social in its aim. In the country school the first-grade child is generally eager to attend because it is the one excitement in an otherwise un-

eventful existence; but from the standpoint of the country teacher, forced to instruct four or five grades, the banishment of the youthful sleepers would be a godsend. Unfortunately, a rural school board would be apt to interpret it as an endeavor to shirk her work.

SCHOOL CLEANING.

In the past the cleaning of a school house was regarded as work of such ordinary character that a discussion of it would have seemed a waste of time. Actually, however, we know that men janitors do not, as a rule, maintain housekeeping standards like those of women; that schools are swept so soon after the dismissal bell that teachers and detained pupils get out through a storm of dust; that the sweeping is mostly dry, without the use of antiseptic solutions or dust-retaining compounds. Men principals usually do not know dirt when they see it, and their offices frequently show the dust of ages. I remember one principal in whose office was an old carpet which, stamped upon, threw up a cloud of dust two feet high. Finally, I asked him why he did not have his janitor sweep it. He asked me to ask the janitor.

Fortunately, we are now entering on a new condition in our city schools at least. Damp mops and rags are used in place of dry brooms and feather dusters. It has been found that sawdust sprinkled on the floor takes up the dust very efficiently when swept up. Some schools go farther and use mops or sawdust dampened with antiseptic solutions. Creolin and chloride of lime are in most common use. Experience has shown that janitors are willing enough to use proper methods and materials when these are supplied by the school board. It is unreasonable, however, to expect a janitor to go down in his pocket for the money to buy these things.

The introduction of vacuum cleaning has led to the equipment of some of our most up-to-date schools with this system. Needless to say this is a great advance over former methods.

The following figures, taken from the report on public schools of the Sage Foundation, show that a majority of the cities sweep their class rooms daily. Most of them also reported the use of damp cloths in dusting, and of sawdust or other ab-

sorbents in sweeping. It will be noted that the washing of floors is less uniformly attended to, once in three months being the most common practice:—

NUMBER OF CITIES IN WHICH THE SCHOOL-ROOM FLOORS ARE WASHED AND SWEPT, WITH FREQUENCIES INDICATED.

Frequency	Cities where floors are washed, with frequency indicated.	Cities where floors are swept, with frequency indicated.
Daily	1	574
Once in 2 days	1	49
Once in 3 days	3	86
Weekly	36	6
Once in 2 weeks	27	2
Once in 3 weeks	8	
Monthly	135	2
Once in 2 months	50	1
Once in 3 months	140	
Once in 5 months	115	2
Once a year	57	
As needed	68	10
Never	44	
Not reporting	73	26
Total	758	758

B. PERSONAL HYGIENE.

By personal hygiene is meant the practice of healthful habits by the individual himself.

Healthful habits include particularly those of muscular exercise, cleanliness, rest, the eating of proper food, the regulation of the bowels, and the discipline of the natural appetites.

Necessity for Popular Information.—A knowledge of the laws of health, with a consequent live desire to live hygienically, is one of the great needs of the day. If the simple instructions issued by our health authorities to sleep with the windows open, keep the house clear of flies, and properly care for the milk were followed, a material decrease in the death rate would result. If the workers in our mills, shops, and mines, the housewives purchasing food, and the dwellers in rented houses were alive to the danger of bad drainage, bad ventilation, bad water supply, and contaminated food, these evils would speedily be remedied.

The landlord would be compelled to supply a decent house in order to secure a tenant; the mill owner would supply fresh air or lose his best employés; the councilman would hear a demand from his constituents to have the streets and alleys repaired; the milkman with dirty hands or a dirty shop would be told emphatically that his milk is poisonous.

Among the more intelligent and prosperous, better conditions naturally prevail, particularly a more cleanly habit. Overwork by professional and business men, social dissipation, and the use of coffee, tea, and tobacco are here the chief unhygienic influences. Nervous exhaustion is the great affliction of the better American class today, due to the rapid pace and refusal to rest and sleep.

Every grade of society is compelled to deal with alcoholism and social vice, which together constitute its greatest problem. Not how to create a desire, but how to *repress* a desire that is either natural or easily acquired, is the task.

How shall the gospel of right living be preached? The last few years have brought forth powerful agencies for the teaching of the public. Tuberculosis exhibits, milk shows, infant mortality crusades, child welfare exhibits, social settlements, are examples of these. Wonderful as are the results of these campaigns, it is evident that THE SCHOOL OFFERS THE ONE OPPORTUNITY TO REACH EVERY PERSON. Here general principles may be taught at an age when they influence the after-life, and special information be given in an orderly systematic manner so that a clear impression remains.

There is no doubt that in the case of the school child the holding forth of an ideal of physical and mental health will lead to effort on the part of the child to attain it. Self-respect and ambition are common human qualities. For this reason the value of an upright carriage and a fine physical development should be constantly urged.

Two or three years ago, in the course of a lecture on physical education, the writer remarked that every school room should have in it two or three plaster statues of athletes, in order to keep before every boy the knowledge of the human form properly developed. Jokingly the remark was made that if the statues could not be obtained a picture of the redoubtable John L.

Sullivan would make a good substitute. A reporter of a Philadelphia newspaper who happened to be present scented a good story and quoted (?) the remark with appropriate big headlines as follows:—

"Every school room should have a picture of John L. Sullivan, James J. Corbett, or some other great man hanging on its walls to show the boys what physical development means," said Dr. Walter Cornell, assistant medical inspector, in an address on "Physical Defects of Children," delivered last night at the Normal School, Thirteenth and Spring Garden streets.

There was an audible titter among the teachers when the speaker pronounced the names of these prizering heroes.

"Yes; I mean it," Dr. Cornell said emphatically. "They ought to be held up as examples of physical fitness, just in the same way that we hang up 'God bless our home' mottoes. They'd work by suggestion.

"Opposed to the statue or picture of John L. Sullivan I should suggest a representation of a physical wreck, just to give the youngster a demonstration of both extremes."

The next day a Boston paper stated:—

John L. Sullivan has expressed himself upon the statement made by Dr. Walter Cornell, assistant medical inspector of the Philadelphia public schools, last week, when he declared that the walls of the school rooms should be adorned with the pictures of all the well-known pugilists, in order to inspire the children with the hopes of physical perfection as well as mental.

John L. says:—

"Dr. Cornell believes that pictures of the champions, past and present, will do more to benefit the coming race than 'Love your teacher' or 'God bless our home' mottoes. Dr. Cornell thinks both boys and girls should be taught the care of their bodies and the development of the muscles. He would teach boys to box and make them self-reliant.

"I expect there will be a great howl go up from a lot of dyspeptic editorial writers when Dr. Cornell's speech catches their eye. But 'Doc' is right. It would do more good to have my picture hung up in the school rooms than it would to put John D. Rockefeller's map on the wall. I have some good pictures of myself, and my press agent will hold himself in readiness to supply the wants of the school committees throughout the country. But I expect there will be no great clamor for my photo. School committees do not look at these things in Dr. Cornell's way."

The point of this recital is that quite a number of my teacher friends afterward remarked to me that the idea was a

good one, and, barring pugilistic attitudes, they were in favor of it.

Of course, there are narrow-minded persons who will jump to the conclusion that the upbuilding of the children's health will mean a "lowering of scholastic ideals." Luckily such persons are rare, and becoming more so every year. I am glad to say that they are not found among the teachers whom I have met. The attitude of the latter is, indeed, most interesting. The average school teacher is not of remarkable physique, being a product of the old-time all-study curriculum, which endeavored to furnish a scholastic mind, a high-strung nervous temperament, rather poor nutrition, and a flat chest. The new health curriculum, discussing, as it does, these very defects and the means of overcoming them, has caused more than one teacher to remark: "I would give anything to have been taught this when I was a child," and vigorously join the crusade to prevent the nervous exhaustion, stoop shoulders, near-sight, lost teeth, and dyspepsia seen in such a large proportion of adults today.

The personality and enthusiasm of the teacher influence strongly the instruction on health matters. The teacher who knows that *in loco parentis* does not mean police supervision, but does mean wise counsel, will feel the sacred obligation to steer her young charges aright, with wisdom born of personal experience, to enliven the impersonal teachings of textbooks.

Instruction of Young Children.—Little children should be taught particularly the value of fresh air, of personal cleanliness, the care of the teeth, the preferability of milk to tea and coffee, and a few important truths concerning the care of milk by the farmer, dairyman, and consumer. Early instruction in the effects of alcohol and tobacco may be given for the sake of the lasting impressions produced by early training, and to head off cigarette smoking. We should realize that the small boy smokes not for narcotic effects, but to satisfy curiosity and love of excitement. Cigarettes, penny pipes, corn-silk, catalpa beans, cubeb and cinnamon cigarettes are pretty much in the same class. For this reason our principal effort should be to punish illegal venders of cigarettes.

The instruction of very young school children in the value of exercise, on the other hand, is unnecessary. The young

growing child possesses a natural activity which will take care of itself if we but give it a chance.

Play, muscular fatigue, good circulation, good appetite, good digestion, and sound sleep are all natural to a child. Here the responsibility rests entirely with those who by reason of long uninterrupted school hours and repressive police measures keep the child in a stiff school seat for hours, and drive him off the street after school. So our stoop-shouldered, spinal-curvatured, and anemic children are made, and in many cases the germ of tuberculosis implanted, simply because the child, like a plant placed in a cellar, was not given a chance.

Instruction of Intermediate Pupils.—Children whose ages range from 10 to 12 years may well be taught the value of good food, of proper sleep, and of emotional discipline. Eye-strain, decayed teeth, and adenoids may well be explained to them. The causation of sore throat by mouth-breathing and by indigestion is so vital a matter in the child's life that it should be included in the health lessons.

The safeguards surrounding the school child should be explained to him—the ventilation system, the lighting plan, the physical education exercises, and the sanitary drinking cups. In their own way, they are just as important as the fire escape. They afford to the children the best possible illustration of the truths propounded, and the discussion of them insures their use by the school authorities. When the temperature of the room is recorded, the children's hands inspected, and handkerchiefs exhibited as the routine beginning of the daily "physiology" lesson, then the subject of health will be placed on the same exact basis which arithmetic and spelling now enjoy.

The subjects recommended for young children should not be dropped, but should be taught to these intermediate children more vigorously than ever. They are now at an age where the value of fresh air can be proven by referring to the death rate from tuberculosis; cleanliness can be advocated by calling attention to the skin diseases caused by dirt, and the better business chance of the cleanly boy; the food value of bread, butter, and milk may be contrasted with that of cheap cakes, candy, and coffee.

Instruction of Older Children.—Adolescence brings with it not only physiological changes and new social activities, but also (in most children) an introduction to the working world. The awakened sexual instincts, the unstable nervous condition, the long working hours, the desire for good clothes and companionship, and the gaily dressed temptations frequently encountered all demand education and character to understand them and conquer them.

For this reason high-school pupils should be particularly instructed in the value of muscular exercise, the value of a sound, nervous system, the social and business asset residing in a manly appearance, the elements of sexual hygiene, the annual money expenditure per capita on alcohol, coffee, tea, and tobacco, and the absolute value of generally temperate habits if health is to be preserved.

III. DEFECTS AND DISEASES.

THE EYE

SIGHT is the most important of man's senses, and the eye the most delicate of his organs. Diseases and defects of the optical apparatus, therefore, resulting, as they may, in blindness or diminished vision and in numerous secondary evils, such as nervous disorders and spinal deformities, should receive the most careful attention during the period of childhood.

Very few eyes possess absolutely poor vision, although, on the other hand, very few eyes refract perfectly without some muscular effort.

Under the conditions of our civilized life, which demand years of study in school, and frequently a subsequent clerical occupation, scarcely three-fifths of American children escape the recommendation of eye-glasses after an oculist's examination. Of the remaining two-fifths, a majority have eyes belonging to that class which serve their possessors well enough under conditions of natural life, but show symptoms of fatigue and blurring of vision from the strain of reading and other near work. Affections of the eye, so far as they fall in the practical province of medical inspection, may be classified under (*a*) affections of the eyelids, conjunctiva, and cornea, and (*b*) eye-strain.

AFFECTIONS OF THE EYELIDS, CONJUNCTIVA AND CORNEA.

These are usually inflammatory in character and include styes, congested lids, various forms of conjunctivitis including trachoma, and keratitis. They may be classified into two groups: those congestions and inflammations which are secondary to eye-strain and whose cure is therefore effected by the procurement of eye-glasses to relieve the underlying cause, and those inflammations which are primary in character.

AFFECTIONS OF THE EYELIDS, CONJUNCTIVA AND CORNEA DUE TO EYE-STRAIN.

The physiologic law that exercise of any part determines an increased flow of blood to that part furnishes the explanation for the congested or inflamed condition so frequently seen in eyes which have been subjected to overwork. Not only does the ciliary muscle inside the eye (the muscle which is actually overworked) become overdeveloped from prolonged strain, but the eye's appendages, the lids and conjunctiva, share sympathetically in the process. Hence bloodshot eyes, congested, inflamed and crusted eyelids, and styes are frequently found associated with eye-strain. The styes probably occur from infection by reason of frequent rubbing of the itching, congested lids.

Swollen, crusted or reddened eyelids, inflamed eyes and styes are therefore always suggestive of eye-strain.

When due to this cause, both eyes are usually affected, although in the case of styes it is not uncommon for the more defective eye alone to suffer. Like the headache due to eye-strain, these congestions and inflammations are more or less chronic in character, existing either continually or after periods of prolonged eye work.

In addition to the inflammatory conditions just mentioned the nervous effort accompanying eye-strain involves sympathetically the adjacent facial muscles and a tense facial expression, "squinting" of the eyelids, and wrinkling of the forehead result. At first these are present only during the period of effort (reading, sewing, etc.), but gradually a characteristic permanent facial expression is acquired.

Finally nervous exhaustion may produce twitching or spasmodic blinking of the eyelids, a local form of habit-spasm termed blepharospasm. Like most habit-spasms, its occurrence usually signifies a nervous person and its site a focus of reflex irritation.

The keen teacher can, therefore, detect a large proportion of the eye-strain cases existing in a class room by simple observation alone.

PRIMARY AFFECTIONS OF THE EYELIDS, CONJUNCTIVA AND CORNEA.

Teachers are reminded that inflammation of the eyelids is termed blepharitis. The cornea is the clear transparent substance forming in its situation the entire coat of the eyeball, and located in front of the pupil and the iris. The conjunctiva is the membrane which covers the inner surface of the eyelid and the exposed surface of the eyeball. It is only loosely attached to the latter in order to allow free movement of the eyeball behind it. This is demonstrated at the time of operation upon the eye, when it is picked up by the surgeon with a pair of sharp forceps.

The three principal affections to be considered are infections of the eyelids and conjunctiva, phlyctenular conjunctivitis and irritation by a foreign body.

Infections of the Eyelids and Conjunctiva.

(a) Simple Conjunctivitis.

This is evidenced by redness of the eyelids and conjunctiva and by discomfort and watering of the eyes. It may be caused by dirt or dust, although this true cause is frequently overlooked and the condition is spoken of as a "cold in the eye."

(b) Acute Epidemic Conjunctivitis.

This usually resembles a severe attack of the simple conjunctivitis just described and occurs epidemically. Its existence as "pink eye" is frequently commented upon by the local press in the community affected. It is usually caused by the Koch-Weeks bacillus or the pneumococcus. It may be slightly contagious, since different members of the same family are frequently affected. A non-infectious epidemic conjunctivitis occasionally occurs in the spring and summer months from pollen in the atmosphere. The individuals affected are usually adults rather than children, of a nervous and gouty constitution and the condition is variously described as "pink eye," "hay

fever" or "rose cold," according to the source of the irritation. An accompanying acute nasal catarrh is characteristic.[1]

(c) Trachoma.

"This is a disease primarily of the eyelids characterized by inflammatory thickening and drooping of the lid, velvety or granular condition of the delicate inner lining membrane of the lids, and discharge variable in amount, finally leading to scar-

Fig. 72.—Trachoma.

ring and atrophy of lid structures, the eyeball itself being liable to serious implications as the disease progresses, ending often in great impairment of vision, sometimes blindness." (From the London Health Report.)

It is exceedingly difficult to cure, and among ignorant foreigners is often practically incurable. Without treatment it is progressive, and no treatment can remove or fully repair the permanent injury previously wrought. Happily, although con-

[1] A useful lotion for cleansing the eye, and the one most generally used, consists of a saturated solution of boric acid in water. A saturated solution contains about one-twentieth part boric acid. Dissolve the boric acid in hot water.

tagious, it is but mildly so, and intimate family contact is usually necessary to spread it, although whole families are often affected. During the last few years the successful treatment of trachoma has been accomplished by rolling the inner surfaces of the eyelids, thereby breaking up the granular, beef-like tissue in which the germs lurk deep and protected, with the immediate subsequent application of silver nitrate or similar solution.

Fig. 73.—Examining for trachoma.

Cases have been successfully treated by exposure to the X-rays, although the danger to the eye itself by this method makes it unsatisfactory.

The prevalence of trachoma undoubtedly varies greatly in different countries, but authorities differ widely as to the actual existence of the disease. It is practically confined to the lowest classes of Continental Europe, and the cases seen in America and Britain are foreign immigrants. In southeastern Europe, however, the disease prevails among the poor to a truly frightful

extent, and few families who can afford private tuition send their children to the public schools. Sufferers from trachoma are forbidden entry into the United States. In the year 1909, at the port of Naples, 20,000 prospective immigrants were rejected by the American inspector stationed there. The countries of northwestern Europe are practically free from trachoma, the London Health Report on Schools of 1904 showing but 25 cases, with a note that those were practically all Russian Jewish immigrants. In southeastern Europe it is so common that a large proportion of the lower-class population is affected. The Eastern cities of the United States, receiving, as they do, thousands of immigrants from Italy, Austria, and Russia, have found quite a large number of trachoma cases in their foreign quarters. This number, it is true, has been exaggerated by the inclusion of large numbers of cases of follicular conjunctivitis and by the hasty inclusion of doubtful cases by examiners exhibiting trachoma hysteria.

Undoubtedly in New York City the disease is of great frequency, and I have the statement of Dr. Cronin, in charge of the work of school medical inspection, that the correct diagnosis of these cases is undoubted, since the inspectors receive special hospital and dispensary training, and the cases are again seen by department specialists for treatment. (The inspectors are instructed to refer doubtful as well as evident cases; so the rejection of 25 per cent. by the specialists does not imply ignorance on their part.) The first year's inspection disclosed about 17,000 cases, which so swamped the various eye dispensaries, and annoyed their surgeons by the noises, filth, and presentation of blank certifications of treatment from the school authorities, that it was found necessary to establish a municipal hospital and two dispensaries for trachoma cases. Here, in 1905 alone, 10,682 cases were treated by 1460 operations and 172,327 treatments. (For further figures on trachoma in New York City see the section on Results of Medical Inspection, and also the chapter on the Prevalence of Defects and Diseases.)

The opportunity was presented to the writer of personally ascertaining the prevalence of trachoma in Philadelphia in the year 1909 by means of a special examination of 3000 poor Italian school children. Twelve undoubted cases and about twenty others

more or less suspicious were found. Since the total Italian and Russian school population, public and parochial, in Philadelphia equals about 30,000, the total number of trachoma cases in school should, therefore, be 120. For the total foreign population, adults and infants included, probably 500 would be an outside estimate.

It is interesting to note that trachoma may exist undetected and therefore may be propagated inadvertently in institutions for the care of indigent children. Superintendent Neibecker, of the Glen Mills, Pennsylvania, Reform School, informs me that an expert examination of the 700 boys under his care revealed 12 trachoma cases.

(d) Specific Conjunctivitis.

Acute conjunctivitis of specific character is an exceedingly dangerous affection marked by inflammation of the eyelids and discharge of pus. Its occurrence signifies venereal disease, either in the individual himself or in some one recently in direct or indirect contact with him. It is the greatest single cause of blindness, the newborn infant being infected by the diseased mother. Children accidentally infected by contact with infected persons, towels, etc., are occasionally brought to hospital dispensaries, but are practically never found in school.

Phlyctenular Conjunctivitis.

This disease is characterized by an eruption of phlyctenulæ or "specks" on that part of the conjunctiva covering the eyeball (but not on the inner surface of the lid). The phlyctenulæ also may occur on the cornea or on the margin of the cornea where it joins the conjunctiva. Each is at first a small, solid, gray elevation, averaging about 1/12 inch in diameter, which later may disappear, but more often softens and breaks down, leaving a small ulcer. Each speck is surrounded by a red, inflamed area, so that an inexperienced examiner may readily fail to notice the true condition and think the case one of simple conjunctivitis.

If the ulcers just mentioned are on the conjunctiva covering the sclera (the white of the eye) no damage results; but if

situated on the cornea and deep enough to cause a white opaque scar on healing, dimness of vision is a permanent sequel.

A very noticeable symptom in addition to those already mentioned is the hypersensibility of the eye to light. The irritation is so great when the cornea is the part affected that the sufferers seek a dark room, hide the face behind the hands or bury it in a pillow, and, when exposed to ordinary light, hang the head, and shut the eyes spasmodically.

Phlyctenular conjunctivitis is encountered by ophthalmologists in the course of free dispensary work, but compared to the whole number of the population it is rather rare. During three years' medical inspection in one of the better residence sections of Philadelphia, I saw but 3 cases among 6000 school children, and observed opacities of the cornea (cloudy whitish scars from old healed ulcers in 5 or 6 more). A two years' experience with over 9000 Russian-Jewish, Polish and Italian school children in the poorer quarter of the same city has resulted in the observation of probably 50 cases, almost all of whom were poorly nourished children under 10 years of age. The disease appears to be constitutional in origin, since the eye affection is accompanied by poor general health, eczema of the eyelids, face and ears, and by nasal catarrh. Cases but lately cured have a tendency to relapse, and the best aid to treatment is fresh air and good food. The victims seem to be those predisposed to tuberculosis and the sweeping assertion has been made that it is found only in tubercular children. Exceptionally a case is seen in a well-nourished child.

Irritation of the Eye by a Foreign Body

may be suspected if but one eye is affected, and considerable inflammation develops in an hour or two. The child himself often states the nature of the trouble. The foreign body is usually easily discovered by turning up the upper eyelid or drawing down the lower one. A pocket magnifying lens is often very useful.

Acute epidemic conjunctivitis in the spring and summer seasons, caused by the irritation of plant pollen, has been already mentioned under the head of epidemic conjunctivitis, although logically classified under this heading.

EYE-STRAIN.

PRELIMINARY OPTICAL CONSIDERATIONS.

Properties of Lenses.

The rays of light emanating from a luminous point radiate in all directions and consequently *diverge.*

If the seeing eye be close to the object point which is emanating rays of light, it will receive a considerable proportion of these and many of these rays will diverge widely from others (Fig. 74).

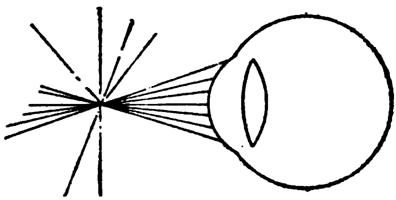


Fig. 74.

If, however, the seeing eye be distant from the luminous object it will receive only a very small proportion of the emanating rays of light and these will be practically parallel with each other (Fig. 75).

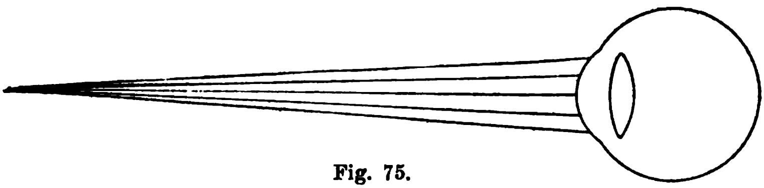


Fig. 75.

Rays of light received by the eye which come from an object 12 or more feet distant are (for practical purposes) parallel to each other. Therefore objects 12 or more[1] feet distant from the eye are said to be *distant objects.* This is the reason the ordinary card for testing *distant vision* is designed to be placed not less than 12 feet from the person examined, and the type to be read at 12 feet is the smallest type used.

[1] It is desirable to use a distance of 20 feet if possible.

A *convex lens* collects the rays of light emanating from an *object point,* and focuses them at an *image point.* The stronger the lens (*i.e.,* the more curved), the closer it is to the image point.

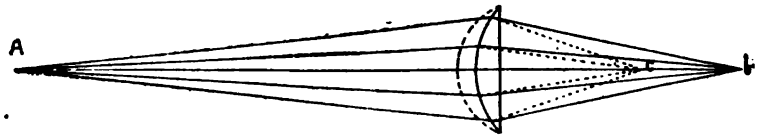


Fig. 76.—Convex lens. The rays of light from the object point *A* are focussed at *b*. If the lens were more strongly curved (dotted lines) the focus would be closer to the lens (at *C*).

A *concave lens* disperses the rays of light emanating from an object point. Consequently no image point is formed.

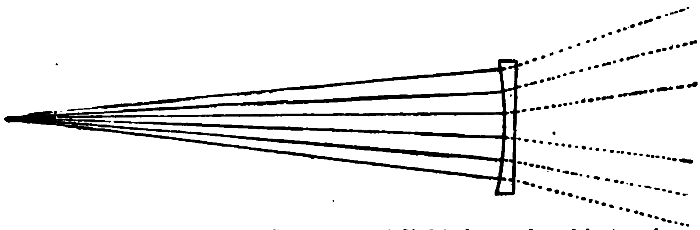


Fig. 77.—Concave lens. The rays of light from the object point *A* are dispersed.

If rays of light which have first been made to converge by means of a convex lens be afterward intercepted by a concave lens the latter will tend to disperse the rays of light and the image point will be focused farther back of the lens (Fig. 78).

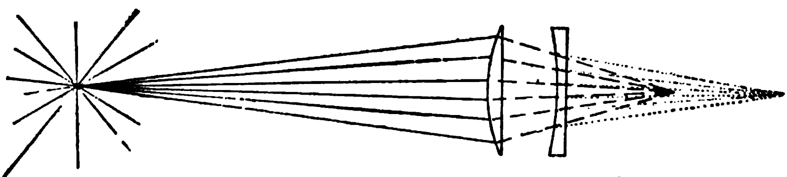


Fig. 78.—Rays of light, just converged by a convex lens, and then dispersed by a concave lens.

The Act of Vision.

The refractive system of the eye for the practical purpose of this description consists of the cornea, lens, and ciliary muscle.

The cornea refracts rays of light, but always to the same degree, as it does not change its curvature. The lens also refracts rays of light, but to different degrees at different times, since the ciliary muscle is attached to it, and by contracting makes the lens more powerful than when in a state of rest. The retina receives the image which the cornea and lens succeed in forming upon it. The accurate focusing which is done by the lens and ciliary muscle, in order to get the image just on the retina and not in front of or (theoretically) behind it, is called the act of accommodation. The ciliary muscle pulls the suspensory ligament of the lens inward and thereby relaxes the capsule of the lens. Thereupon the lens bulges from its own elasticity and becomes more spherical. The focus is accordingly brought forward. *Accommodation always brings the focus forward.*

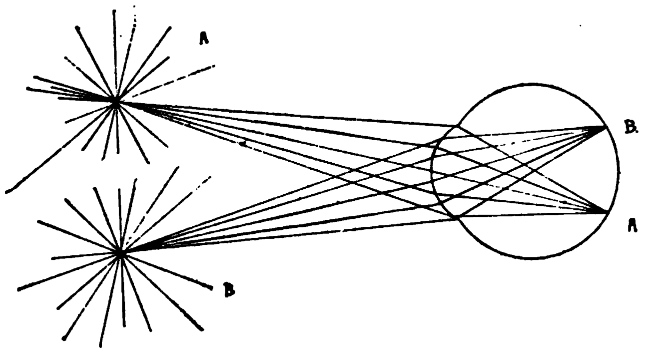


Fig. 79.

The Formation of the Image on the Retina.

At the outset it should be understood that the placing of the image (or picture) on the retina is not a simple transfer of the whole object seen. Let us rather consider every visible object to possess a surface divided and subdivided again and again until each subdivision is an area so small that the eye can barely distinguish it. These little areas may for convenience sake be termed "points," since such they appear to be when looked at. The optical process consists in the reproduction upon the surface of the retina of each small subdivision or "point" on the surface of the object. Each object point is reproduced by

the refraction of innumerable rays of light emanating from it. The *sum* of these reproduced image *points* is the *assembled image* of the complete object.

This can be readily shown by the two diagrams Figs. 79 and 80. In the first is represented the formation of an image

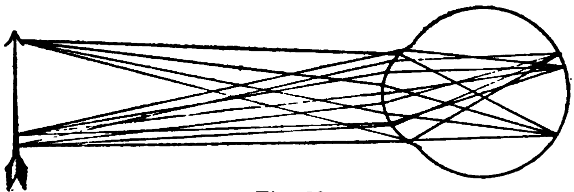


Fig. 80.

point from an object point outside the eye. (Two of these are shown for clearness sake, but they are unrelated.)

In the second (Fig. 80) is represented the reproduction, as image points upon the retina, of three object points on an arrow. From this it can easily be seen that the whole image of the arrow is made up of all the little image points, each coming from its corresponding object point outside the arrow.

The Standard Eye.

The eye of normal construction and therefore of proper exact focus demonstrates by experiment that it has the power to distinguish letters or figures of a certain size at a given dis-

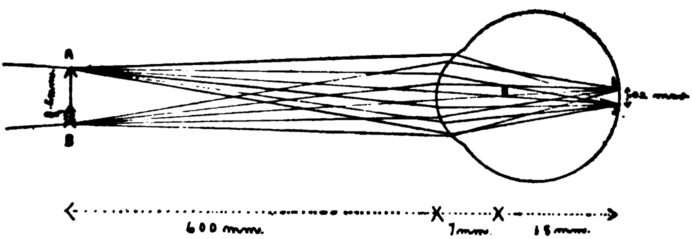


Fig. 81.

tance. This is due to the sensitive power of the nerve elements of the retina. Thus at 6000 mm. (6 meters or about 20 feet) printed characters 8.5 mm. (⅓ inch) can be made out. At this distance anything smaller than this throws such a small image

on the retina that it is discerned as a confused point only. With a knowledge of the anatomy and dimensions of the eye, the size of this minimum retinal image appreciable by us can readily be calculated. It is an area 0.02 mm. in diameter.

The standard conventional eye is represented in the diagram Fig. 81.

Its diameter from behind forward is 23 mm. (7 mm. + 15 mm. + 1 mm. thickness of the eyeball coat at the back).

Notice that the image of the arrow *A-B* is thrown inverted on the retina at *b-a*. Also that the nodal point *N* is 15 mm. in front of the retina. The rays of light from *A* fall upon *a*, and the rays of light from *B* fall upon *b*. The straight lines *A-a* and *B-b* cross at the nodal point *N*. Other rays starting from the object *A-B*, somewhere between *A* and *B*, would likewise pass through *N* and fall somewhere on *b-a*.

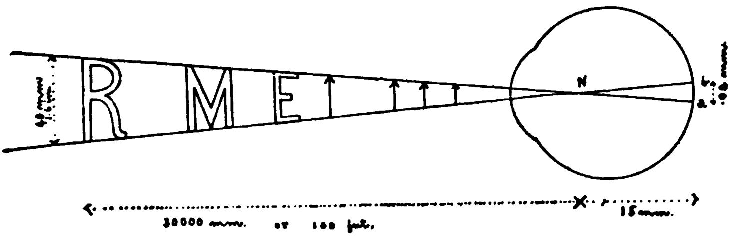


Fig. 82.—The principle of the construction of test type. The subject explained here is the sensitivity of the retina, and therefore the refractive system (lens, etc.) is ignored.

The nodal point *N* is situated 15 mm. in front of the retina.

If $A\text{-}N = 6000$ mm., $A\text{-}B = 8.5$ mm., and $N\text{-}b = 15$ mm., it is easily calculated that the retinal image *a-b* is 0.02 mm. in diameter. *An area 0.02 mm. in diameter on the retina is the smallest on which an image can be received and distinguished as such. A smaller area perceives an object only as a point.*

Explanation of the Test Card, for Vision.

(The principle of construction of the test type.)

Every test letter is constructed of such size that its image thrown upon the retina exactly equals the minimum area just

mentioned, and we may now, ourselves, construct these letters from the facts known.

Using the same figure, we may start from *b-a,* crossing the rays at *N,* and extending them out to any desired length. It is then easy to calculate theoretically not only the size of the smallest object distinguishable at 6000 mm. distance (6 meters or about 20 feet), but at any distance. Thus at 3000 mm. this object would be 4.25 mm. in diameter. At 4500 mm. the object would be 6.41 mm. in diameter. At 9000 mm. (9 meters or about 29.5 feet) 12.83 mm. in diameter. At 30,000 mm. (100 feet) the object would be 40 mm. (or 1.6 inches) in diameter.

Upon this principle the size of the letters used on the test cards is calculated.

DEFINITION OF EYE-STRAIN.

Eye-strain has been defined as any defect in the refractive or muscular apparatus of the eye which is serious enough to give rise to symptoms. A clear understanding of the terms eye-strain, poor vision and refractive error should be constantly borne in mind. It should also be remembered that they may or may not exist together.

Eye-strain signifies *labor* or *effort* with discomfort from fatigue. *Refractive error* signifies that the *eye is not of normal construction,* since the rays of light passing through it are not focused properly and exactly on the retina. If the individual by effort of the eye muscles can change the location of the focus and bring it to the correct location on the retina the refractive error is "latent" (*i.e.,* more or less concealed). If he cannot do this, his vision is of necessity defective and the refractive error is "manifest" (or evident). Both the latent and manifest error are measured by eye specialists during the examination of the eye for glasses. Three subvarieties of refractive error exist, depending on the clearness (astigmatism) and on the location (hyperopia and myopia) of the incorrect focus. *Defective vision* is simply the *inability to see clearly* and may be due to many causes such as injury to the eye, refractive error, degeneration of the optic nerve, or brain tumor.

CAUSE OF EYE-STRAIN.

The causes of eye-strain are (1) refractive error in either eye, or (2) weakness or poor balance of the muscles moving either eyeball, so that the two eyes move together properly only by effort. Since in both cases the overwork or weakness with resulting fatigue resides in the muscles, it follows by physiological law that the general health affects the condition of these muscles and often determines whether the strain will be latent or manifest. A person in robust health with a rather high refractive error frequently possesses better vision and less discomfort than another with less refractive error, but in poorer general health.

EVIDENCE OF EYE-STRAIN.

The evidence of eye-strain is furnished both by the *subjective symptoms* and *by defective vision.*

The Subjective Symptoms

complained of are a feeling of distress—usually an aching or drawn sensation—after reading, a feeling of general fatigue sometimes amounting to exhaustion, itching and smarting of the eyelids and frequent frontal headaches. In nervous individuals the reflex irritation of the digestive organs, particularly in cases of astigmatism, may cause nausea. Train-sickness, sea-sickness and migraine are frequently due to this cause. The child may assume peculiar postures as he leans forward to see the blackboard, or bends over his desk to write. The effort to see clearly may cause "squinting" of the eyelids. The child himself may be conscious of defective vision at times and state that the use of the eyes for any considerable period results in blurred vision so that "the letters become mixed up and run together."

Defective Vision

is the objective and second manifestation of eye-strain.

For the practical purposes of medical inspection the reading of the ordinary test letters is a sufficiently accurate method of determining its existence, although the medical inspector should be familiar with the special tests mentioned in the sub-

sequent paragraph in order that, if occasion require, the diagnosis may be accurate, scientific, and positive.

The use of the ophthalmoscope has been practised by a few individual examiners, but, while undoubtedly an interesting and helpful procedure, it is considered far too specialized for consideration here.

THE TEST FOR DISTANT VISION.—As has been before stated, this is the most important of the tests. Its principle

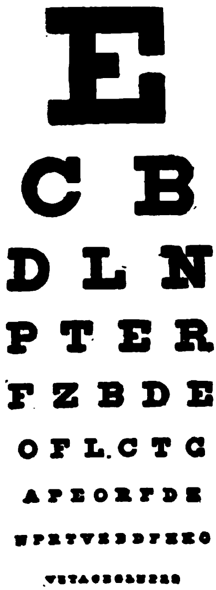


Fig. 83.

has been already explained in the paragraph on the "Standard Eye." The card employed presents letters of various graded sizes. Figures over each line of letters indicate to the examiner the distance at which they should be seen by the normal eye. Our American charts usually express the distance in feet rather than in meters. Usually the top letter is of a size to be distinguished at 200 feet, the next row or line at 100 feet, the next row at 70 feet, and so on down to the bottom row, which is of a size to be read at 15 feet. Some charts have below this a row of letters to be read at 12 feet, and even at 10 feet, but

these are not absolutely accurate, and should be used only when a small examining room necessitates it.

The test card should be hung on the wall, say, 20 feet (6 meters) distant from the person examined, who is comfortably seated, at a few inches below the level of his eye. It should be well illuminated, preferably by a steady, artificial light. The card should not be placed in the sunlight, as the reflection is irritating to the eyes, and they rapidly tire. On the other hand, examinations by natural light or on dark, cloudy days are of very little value, since the retina, even if the eye be normal, is then not sensitive enough to distinguish the test letters clearly. Cases have been recorded in which children actually possessing normal vision have been able to read only the upper letters on dark days and have accordingly been classified as defective in vision.

One eye is then covered lightly with a blank card, no attempt being made to close it or press on the eyeball. The child is asked to read the letters, beginning at the top and then reading down the chart as far as possible. The degree of vision or vision acuity is then expressed as a fraction, the numerator being the *actual distance* of the child from the chart, and the denominator is the distance at which the line last read should be distinguished by the normal eye. The denominator is often said to be, "the size of the type read."

If the subject has good vision he will read successfully the line of letters calculated for 20 feet, assuming that he is sitting at 20 feet distance. His degree of vision is then expressed as a fraction, actual distance of the child from the chart (20 feet) divided by the calculated distance at which the normal person should be able to read (20 feet). Result, 20 over 20, or a full normal vision.

If the subject has defective vision he will possibly read down the chart only as far as the line marked 50 feet. His vision is then 20 over 50, because he is compelled to stand at 20 feet distance to read type that he should be able to read at 50 feet. If the child's vision be so defective that it is impossible for him to distinguish the larger letters on the chart, he should then approach until he is able to read the top letters, after which the visual acuity expressed as a fraction should be

formulated according to the above rule. If not able to distinguish letters at all, the child should be asked to count the number of fingers held up before him by the examiner. Should this be impossible he should be tested with light alone. If light perception is wanting, the eye is blind.

If defective eyesight is found the child should be asked if he is conscious of his poor vision. (Whether he can see the blackboard, his eyes become tired at night, etc.) These facts should be noticed.

It is important that while the first eye is tested the other should not be pressed against by the card held before it, since its vision will be temporarily impaired thereby and an error of diagnosis will be made. A rather large, stiff card, 3½ by 5 inches, prevents such an occurrence. This is placed against the eyebrow.

Following are given seven specimen records illustrative of those ordinarily made. R. and L. denote right and left eye, and are preferred to the medical nomenclature, O.D. and O.S., as they are intelligible to any one:—

1.	R. 20/20	L. 20/20	
2.	R. 20/30	L. 20/50	Headaches, eczema of lids. Notify 3-20-05.
3.	R. 20/30	L. 20/25	Glasses 1904. Penna. Hosp. Disp. No symptoms.
4.	R. 20/30	L. 20/40	Glasses 1904. Optician's glasses. (No doctor.) Notify 3-20-05.
5.	R. 20/20	L. 20/200	(Opacity of cornea from accident.)
6.	R. 20/20	L. 20/20	
7.	R. 20/40	L. 20/40	Headaches. Notify 3-20-05.
	R. 20/40	L. 20/40	Says mother is too busy to attend to her. (Second notice 4-20-05.)

THE SECONDARY EFFECTS OF EYE-STRAIN.

The secondary effects of eye-strain develop gradually. Their evidence, generally speaking, is proportionate to the degree of refractive error, and the character of the work done by the person affected, except in the case of nervous manifestation, which depends largely upon the nervous constitution of the individual. Some of the secondary defects, such as spinal deformities and habit-spasms, are often incurable. As a powerful

argument against procrastination in the obtaining of these eye-glasses the following groups of secondary effects may be given:—

I. Inflammation or Congestion of the Eyelids and Conjunctiva ("Bloodshot Eyes").

Accumulations on the lid margins of eczematous crusts and of matter, and the appearance of crops of styes, are the principal of these.

II. Spinal Deformities.

Leaning forward in order to see more clearly produces stoop shoulders, particularly characteristic in sufferers from myopia (near-sight). Lateral curvature of the spine may be produced by astigmatism, an effect described in detail in the chapter on Orthopedic Defects. We are indebted to Dr. George M. Gould, of Philadelphia, for the discovery of this relation and the explanation of its occurrence. The latter is simple in principle, although modified by secondary factors in the various combinations of refractive error in the two eyes. Most of the objects around us, trees, houses, letters, are vertical rather than slanting. The individual sufferer from astigmatism will, therefore tilt his head unconsciously to one side until his axis of best vision becomes vertical. "It can be demonstrated on any normal individual that a certain cylindrical lens (lens used for stigmatism) placed so that artificial stigmatism produced shall be at axis 75 degrees will obscure vision unless the head is tilted 15 degrees to the right in order to bring vertical objects into clearer vision."

Dr. H. Augustus Wilson cites 17 cases seen jointly with Dr. Gould and 33 others seen by Dr. Gould alone, illustrating the coincident existence of these defects. In some of these, such as the two recorded in the *New York Medical Journal* of July 28, 1906, the astigmatism amounted to 5 or 6 diopters in one or both eyes.

CASE I.—A young man, aged 14 years, was brought to me in 1900 by his father. He had evident symptoms of eye-strain. I found the following error of refraction: R.—S. O. 25+C. 5.25 ax. 75°; L. S. O. 50+C. 6.00 ax. 75°. This ametropia was properly corrected. The father incidentally remarked that the boy had spinal curvature. I had noticed

that he had a malposition of the head, but I was too stupid to recognize its significance. Dr. H. Augustus Wilson was consulted, verified the diagnosis of spinal curvature, and, by proper treatment, the spinal abnormality and malposition of the head have entirely disappeared. There is no doubt as to the truth of the theory in this case, and almost none, also, as to the fact that without the correction of the ametropia there would not have been so speedy a cure of the spinal malcurvature.

CASE II.—A girl, 14 years old, was sent to me by Dr. W. H. McCurdy three years after the deformity was first observed by her parents. She presented the usual type of S scoliosis with rigidity in deformed posture. The dorsal rotation was pronounced with the concavity to the left. The head was persistently carried to the right. There was no asymmetry of legs. She has been wearing spectacles that she obtained from a traveling salesman. She suffers from typical migraine. Was sent to Dr. Gould, who reported that the following formula was prescribed: R.+S. 0.87+C. 62 ax. 75°; L.+S. 0.52+C. 1.25 ax. 90°.

The question will naturally arise as to whether it was a coincidence that this patient had scoliosis and a peculiar condition of refraction. It appears that serious bony changes had occurred, and the deformity, rapidly increasing, demanded attention, but this was determined upon at so late a period as to prevent entire correction. The natural inference is that the error of refraction had existed prior to the development of the scoliosis and had at least some bearing upon the progress of the condition, from the beginning functional head tilting to functional scoliosis, and to the ultimate bony changes, in which latter condition I first saw the patient.

III. Nervous Disorders.

Nervous disorders incidental to eye-strain may be stated as follows:—

Headache usually located over the eyes. Such headaches are especially frequent in the older girls, particularly those who are anemic or otherwise in poor general health. They are especially marked in cases of astigmatism and any weakness of external eye muscles. Frequently they are known by the children themselves to result from studying. One of the most important of practical truths in the domain of medicine and medical inspection is that frontal headaches are suggestive of eye-strain. Thirty-one per cent. of all juvenile eye-strain cases suffer also

from headaches. Among the boys the proportion is 17 per cent.; among the older girls it rises to 70 per cent. There is no exaggeration in the statement that in Philadelphia, in 1905, when school inspection was instituted there were 1200 children suffering from habitual eye-strain headaches.

Conversely, the *only* considerable cause of *habitual headache* in children is eye-strain (see Prevalence of Defectiveness and the Nervous System). The existence of headache may be used as a fair practical criterion of the existence of eye-strain. The writer in 1908 examined 1300 Italian children in St. Paul's Parochial School, Philadelphia, for trachoma. The school possessed no medical inspector and during the examination of the first group of children several evident eye-strain cases were noted and pointed out to the head of the school. The latter gladly accepted the suggestion that such further cases as were evident from superficial examination be noted, and the procedure was adopted to ask the children, an entire class at a time, how many suffered from frequent headaches. From 3 to 7 responded to each inquiry and further questioning of these as to eye fatigue, the observation of their eyes for congested lids, and a rough test of vision by means of impromptu test letters marked on the blackboard revealed 75 cases during two mornings' work.

Migraine may be considered in this connection as a variety of headache, and what has been said of the latter as an effect of eye-strain applies to migraine also. While not willing to stand with those writers who claim every case of migraine to be a result of eye-strain, the writer fully agrees that nine-tenths of them are of this character, and urges upon every sufferer who has not obtained relief from the procurement of eye-glasses to call a second oculist in consultation before assuming that the cause of the migraine lies elsewhere. Certainly the number of cases of migraine due to causes other than eye-strain is much less than the number produced by improper fitting of the glasses.

Sensations of fatigue in the eyes often occur with a headache and occasionally without the existence of the latter. The child may state that "the eyes hurt," or they "draw out," or the "letters run together," or the letters "jump up and down," or

that colors of different kinds appear when the eye has been used for a time.

General and Local Nervous Exhaustion from Reflex Irritation.—The more obscure and serious nervous disorders resulting from eye-strain generally appear in adult life rather than during childhood years, being precipitated by the age increasing failure of accommodation. Some of them, however, such as chorea and epilepsy occur usually in childhood and others frequently enough to warrant their consideration here. First may be noted a general exhaustion of the nervous system (neurasthenia) recognized in children by the cardinal signs of heightened nerve sensibility, motor fatigue, and lack of emotional control, and found in the adult with various other signs and symptoms only too familiar to the family and to the discouraged attending physician. It has been suggested that the benefit derived from the famous rest cure may be due in some cases at least to the unconscious rest of the eyes from labor and reading. Certainly the wonderful relief, the feeling of a new physical existence, can be attested to by nearly every clerk or student who has attained eye-glasses after months of vague discomfort, and affords a powerful argument for the examination of the eyes in every case of nervous prostration.

Passing to the more peculiar and localized nervous disorders due to eye-strain, those of a sensory nature may be found existing as neuralgia centered in the head, back, heart or stomach, dull backache, intolerance to loud sounds, and more particularly to bright lights. On the motor side, chorea, epilepsy and habit-spasm are most prominent. I personally believe that both chorea and habit-spasm are usually due to gastro-intestinal disorders, but eye-strain (aside from the fact that it may cause the indigestion) should never be overlooked as a possible cause. I have seen two cases of epilepsy, treated for several years by various physicians (one of them, an eminent neurologist), practically cured of the disease by the correction at the age of 20 years of high astigmatism and extra-ocular muscular weakness.

Circulatory disturbances and visceral derangements that may result from eye-strain are vertigo, heart palpitation, indigestion, constipation, nausea, and train-sickness. Lack of space forbids their extensive consideration.

IV. Strabismus.

The production of internal squint from hyperopia and of external squint from myopia is discussed in the succeeding paragraphs on Muscular Weakness.

V. Lowered Scholarship.

The blind and the nearly blind are handicapped more than those possessing "defective vision" for such small objects as the letters on the test card. Blind children are, however, not found in the public schools; so these striking cases of deprivation need not be considered. It would appear only common sense, however, to conclude that a child with poor eyesight in the ordinary sense of the term, after obtaining eye-glasses which improve the vision, will do better school work. Instances illustrating such improvement are fairly numerous in the experience of every inspector. I recollect a young school girl who procured glasses for the relief of eye-strain with one-third vision. She had previously failed twice in promotion, but, after the defect was discovered and remedied, she had no further difficulty with her studies. At the Summer School of the University of Pennsylvania in 1908 there was a good-looking, intelligent girl in the eighth-grade class who was 17 years of age. For some reason she had frequently failed in promotion throughout her school life. Her physical examinations revealed the fact that she possessed but one-sixth vision, was aware of the fact, but refused to wear glasses (presumably) because they marred her good looks.

A statistical study designed to bring out the relation between eye-strain and scholarship is liable to many fallacies, and therefore apt to be misleading. For instance, a child may have eye-strain and yet have perfectly normal vision, the resulting headaches alone betraying the condition. A child may (properly) receive an inspector's notice for defective vision because one eye is defective, yet the other eye sees perfectly well. A child may have myopia (near-sight) and because of poor distance vision be registered as possessing one-fourth or one-fifth vision; yet this child can read the finest type readily, do fine sewing, and for this very reason is likely to develop into a book-

worm. It should be remembered that a majority of the children possessing "defective vision" have eyesight which is nevertheless good enough to see the blackboard and to read books for a half-hour or so without much discomfort. Finally, it has been demonstrated that the literary and better social class have worse eyes, as a rule, than the farmer and artisan class. The ancestors of the former have strained their eyes through several generations. The child whose home associations are such as tend to make him bright and intelligent is the very one who is the more likely to have some slight refractive error.

Therefore, I cannot but feel that the only solid demonstration in this particular field is the record of different series of children, each series dealing with some one variety of eye-strain, and the basis of the demonstration the comparison of scholarship before and after the procurement of glasses. The "defective vision" cases should include only those in whom vision is one-third or less by the test card. Such a series is unfortunately not at hand.

With the limitations mentioned borne in mind, three studies may be here presented. The first is one by Dr. Leonard P. Ayres, of the Russell Sage Foundation, the second by the writer, and the third an analysis by the writer of an extensive statistical table prepared by the London County Council.

Dr. Ayres's report[1] is on "The Effects of Physical Defects on School Progress," published in the *Psychological Clinic* of May 15, 1909, and also in his book "Laggards in our Schools." It covers the scholarship and physical condition of 3304 New York City school children who had been previously inspected by the school physicians. Taking from this report the figures bearing upon the eyesight of children of differing mental ability, the proportion of dull children suffering from defective vision is 24 per cent., of normal or average children 25 per cent., and of bright children 29 per cent. The dull, normal, and bright groups were determined by their age-per-grade; the study was made upon those children who were between 10 and 14 years of age; the term "defective vision" means all cases so

[1] In this article Dr. Ayres pointed out the difference in statistical results when emphasizing the age factor, owing to the decrease of the majority of children's notable physical defects with increase of age.

marked by the medical inspectors. It will be noticed at once that Dr. Ayres's results are exactly the opposite of those we would naturally expect, since the cases of defective vision were most numerous among the bright children. The general high character of Dr. Ayres's work presupposes the correctness of his results. Their significance, however, is not at once apparent and may be misleading. The writer believes that they serve well to show that total figures dealing with all sorts of eye-strain cases do not give satisfactory information. The principal defect in the material lies here in the medical inspectors' records used by Dr. Ayres, which under the head of defective vision included too great a variety of conditions and too great a difference in the degree of defect which existed.

Dr. Ayres's unexpected results are, to a certain extent, paralleled by those obtained by the writer in the Claghorn School, Philadelphia (see page 275). Here a comparative study of the physical condition of two classes of bright children with two classes of rather dull children showed practically the same vision in each group, the difference in favor of the brighter children (0.888 to 0.886) being insignificant. In this case the occurrence of deafness and adenoids in many of the children in the dull group apparently explain the difference in scholarship.

The second study to be considered is one by the writer, made in the Allison School, Philadelphia, and reported in the *New York Medical Journal* of June 1, 1907. A series list was made of 219 primary-grade children, their visual acuity, and their term marks in arithmetic, geography, and spelling. According to visual acuity there were three groups. Vision over ¾ was considered good; between ¾ and ½ fair, and less than ½ poor.

The relation of the visual acuity to the scholarship was as follows:—

	Arithmetic.	Geography.	Spelling.	Average.
Normal vision	79	69	76	75—
Fair vision.........	70	71	77	73+
Bad vision	66	70	71	69

The third and last study of the relation of defective vision to poor scholarship is here presented for the first time by the writer, although written several years ago. The report of the London County Council for 1904 gives the results of the examination of the eyes of 32,000 school boys and 29,000 school girls. The summary is given by grades, by sexes, and by the degree of vision ($^{24}/_{24}$, $^6/_9$, $^6/_{12}$, $^6/_{18}$, $^6/_{24}$). The largeness of this number does away with personal causes of error, since a large number of examiners contributed. The children were from all social classes.

Because of its size I am compelled to limit analysis to a fragment of the report, taken at random. A dozen other corresponding analyses could be made, using different grades and sex.

Taking the figures on the girls of the fifth "standard" or grade, the report shows their ages to range from 9 to 13 years. It is evident that the children of 9 years are precocious, those of 10 years bright, those of 11 and 12 years average, and those of 13 dull.

Assuming that good vision means $^{24}/_{24}$, fair vision $^6/_9$ to $^6/_{12}$ (an average of $^{14}/_{24}$), and bad vision $^6/_{18}$ or worse (let us say $^7/_{24}$), we may construct the following table:—

Children with	Aged 9.	Aged 10.	Aged 11.	Aged 12.	Aged 13.
$\frac{24}{24}$ or Good vision....	38	497	1245	1306	914
$\frac{14}{24}$ or Fair vision.....	8	92	303	326	248
$\frac{7}{24}$ or Bad vision.....	11	43	143	196	151

Calculating, now, the average vision for all the scholars of each age, we find that those of 9 years $= \frac{19.3}{24}$; 10 years $= \frac{21.4}{24}$; 11 years $= \frac{20.9}{24}$; 12 years $= \frac{20.4}{24}$; 13 years $= \frac{20.2}{24}$.

In other words the vision is progressively better with the scholarship, *except in the small number of 9-year-old precocious children.* Why this exception exists I do not know. Possibly they are examples of abnormal precocity and poor physical health.

The condition is just as well shown, and more simply, by noting in the first table the ratio of the children with bad vision to those with good vision. At 9 years this was 11 to 38, or a ratio of 1 to $3\frac{1}{2}$; at 10 years 43 to 497, or a ratio of 1 to $11\frac{1}{2}$; at 11 years 1 to $8\frac{1}{2}$; at 12 years 1 to 6; at 15 years 1 to 6.

To be sure of the truth of these results, a second analysis was made of a fragment of the London Report on the basis of *age*. All the children of 10 years were noted, as well as their visual acuity; and by the same methods, the *average vision* for the children of each grade was calculated.

From the Report.				Author's Analysis.	
Grade or standard.	Good vision.	Fair vision.	Bad vision.	Average vision.	Proportion of good vision to bad vision.
I	33	30	17	$\frac{16.6}{24}$	2 to 1
II	188	99	46	$\frac{16.5}{24}$	4 to 1
III	1447	498	216	$\frac{18.12}{24}$	$6\frac{2}{3}$ to 1
IV	1311	355	182	$\frac{20.4}{24}$	$7\frac{1}{5}$ to 1
V	497	92	43	$\frac{21.4}{24}$	$11\frac{1}{2}$ to 1
VI	76	16	11	$\frac{20.6}{24}$	7 to 1

Here, again, with the exception of the small number of very precocious children in the sixth grade or standard, *the vision is progressively better with the scholarship of the children; and also, the cases of bad vision are relatively more frequent among the more backward children.*

THE DIFFERENT FORMS OF EYE-STRAIN.

Eye-strain may depend upon (1) difficulty or inability to locate the focus upon the retina (hyperopia and myopia); (2) inability to form a focus at all (astigmatism), and (3) poor balance of the muscles moving the eyes, so that their relation to each other is faulty. The first and second varieties are caused by refractive error. The third is caused by weakness of the extraocular muscles.

Faulty Location of the Focus.
(Hyperopia and Myopia.)

Definition.—Emmetropia is the optical condition found in the eye of perfect construction. In emmetropia the rays of light emanating from a distant point (*i.e.*, parallel rays) are so refracted by the cornea and lens that they are focused to an

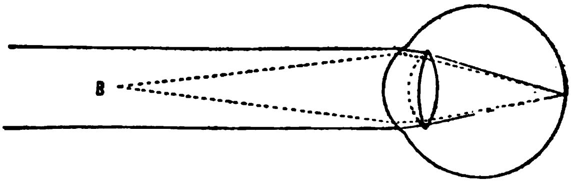


Fig. 84.—Normal emmetropic eye. Parallel rays from a distant object point (*A*) focused on retina by usual curvature of cornea and lens (solid lines). Divergent rays from a near object point (*B*) also focused on retina by "accommodation" of the lens (dotted lines).

image point exactly on the retina. It is assumed that the eye is in a state of rest, *i.e.*, there is no accommodation by reason of action of the ciliary muscle.

In emmetropia divergent or radiating rays of light from near objects (say at a distance of two feet) also form images

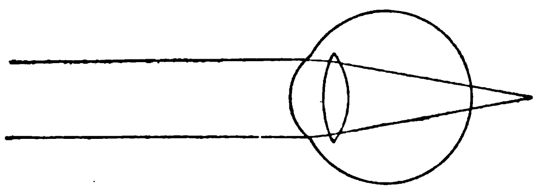


Fig. 85.—Hyperopic eye (at rest). Rays of light from a distant object point are focused behind the retina.

exactly upon the retina, provided the curvature of the lens is sufficiently increased by the action of the ciliary muscle, *i.e.*, by accommodation.

Hyperopia is the optical condition in which rays of light emanating from a distant object point (*i.e.*, parallel rays) are focused to an image *behind the retina*. It is assumed that the

eye is in a state of rest, *i.e.*, there is no accommodation by reason of action of the ciliary muscle.

If accommodation (which always brings the focus forward) can correct the hyperopia by placing the image point upon the retina (Fig. 86), the hyperopia is said to be *latent*. If accommodation fails to bring the image point forward far enough to

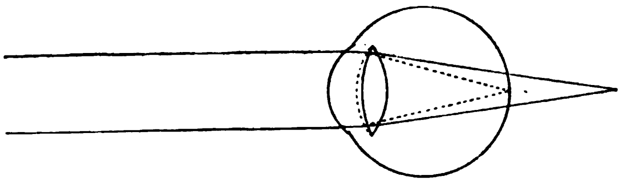


Fig. 86.—Latent hyperopia. Accommodation (see dotted lines) brings the focus forward on to the retina.

place it upon the retina (Fig. 86), the hyperopia is said to be *manifest*.

Since the image point of a near object point (which sends divergent rays to the eye) is farther back of the lens than the image point of a distant object point (which sends parallel rays to the eye), it follows that in hyperopia the error of vision is worse for near objects.

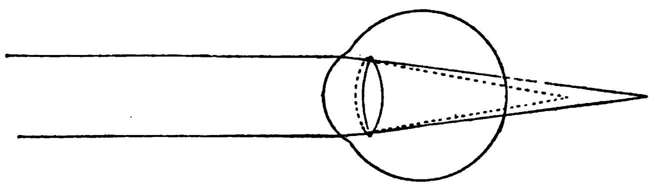


Fig. 87.—Manifest hyperopia. Accommodation tends to bring the focus forward to the retina, but fails to do so.

The correction of hyperopia is effected by a convex eye-glass (Fig. 89), since a convex lens brings the focus forward.

Myopia is the optical condition in which rays of light emanating from a distant object point (*i.e.*, parallel rays) are focused to an image point *in front of the retina*. The cornea and lens refract too strongly and the image point is focused somewhere in the vitreous chamber of the eye. It may also be defined as a condition in which the eyeball is *too long*.

Since the image point of a near object point (which sends divergent rays to the eye) is farther back of the lens than the image point of a distant object point (which sends parallel rays to the eye), it follows that in myopia the error of vision is better for near objects.

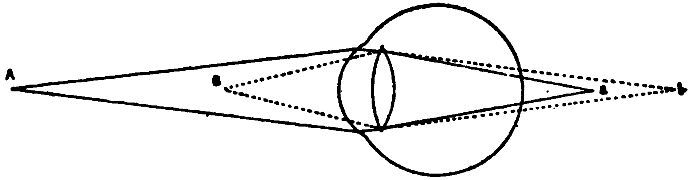


Fig. 88.—Hyperopia showing the focus (*b*) for a near object point (dotted lines) to be farther from the retina than the focus (*a*) of a distant object point.

The correction of myopia is effected by a *concave* eye-glass, since a concave lens disperses rather than collects rays of light.

Symptoms (see also page 215).—Hyperopia in a slight degree is the usual condition found in the human eye and a very trifling amount of accommodation required to correct it gives perfect vision with no symptoms of fatigue. The child with

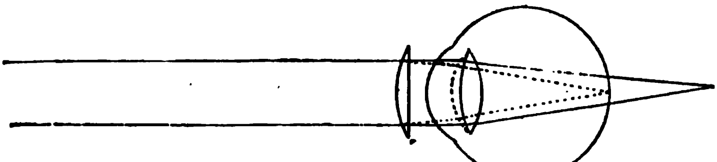


Fig. 89.—Same hyperopic eye as shown in Fig. 87. A convex glass placed before the eye assists in converging the rays of light (dotted lines), so that they are now brought forward to the retina. A still stronger eye-glass would do this without the exercise of accommodation at all. The former (shown in the figure) is termed *partial correction;* the latter *full correction.*

latent hyperopia of pronounced degree also possesses good vision, but considerable fatigue (eye-strain) is experienced by reason of frequent and painful accommodation. The child with manifest hyperopia experiences eye fatigue with all the effects just mentioned and suffers with defective vision also.

Latent hyperopia is therefore most puzzling to the teacher or general practitioner whose examination is limited to the simple reading of test type for distant vision. The good vision by test, on the one hand, and the headaches, congested eyelids, pains in the eyes, on the other hand, make an apparent contra-

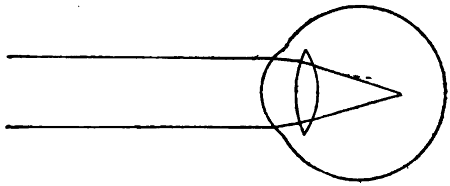


Fig. 90.—Myopia. The focus is in front of the retina. Since the accommodation always brings the focus *forward*, it follows that accommodation in the case of myopia makes the error worse. The myopic eye is therefore helpless, and for better vision the object viewed must be moved nearer, or an eye-glass used.

dictory state of affairs. The only proper and accurate means of diagnosing this condition is to refer the case to an oculist and thereafter by the use of a cycloplegic, such as atropine, paralyze the ciliary muscle and thus eliminate it during subse-

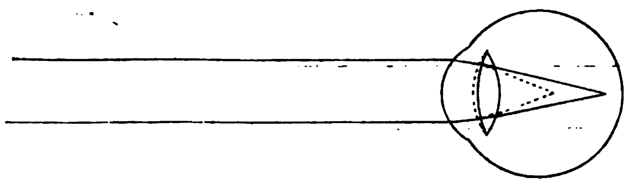


Fig. 91.—Myopia. Accommodation (dotted lines) makes the refractive error worse.

quent examination. At this time the inability to read test letters compared with previous successful attempts is striking.

In myopia or near-sight the vision is good only for objects close at hand, and therefore the most striking evidence is the inability to see objects distinctly beyond a limited distance. The myopic person will have difficulty in recognizing his friends at a distance or the numbers of the houses as he walks along, but will be able to read the finest print because it is close to the

eyes. Distant vision as tested with the general test card is usually very poor. As a consequence it is worth while to note that children with myopia are usually fond of study and reading, and avoid outdoor sports. Headaches and eyeaches may occur, but are only fairly frequent. Round shoulders from leaning forward is a suspicious symptom.

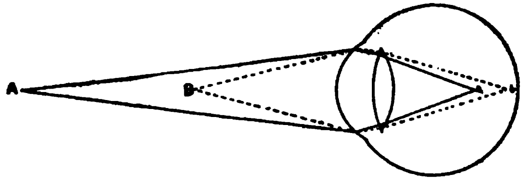


Fig. 92.—Myopia showing the focus (*b*) for a near object point (dotted lines) to be nearer the retina than the focus (*a*) of a distant object point (solid lines).

The ultimate effects of myopia upon the eye itself have been mentioned in the paragraph defining the condition. Increase of the myopia is common, and detachment of the retina with almost total loss of vision is a possible result if treatment be neglected.

Differential Tests for Hyperopia and Myopia.—The test

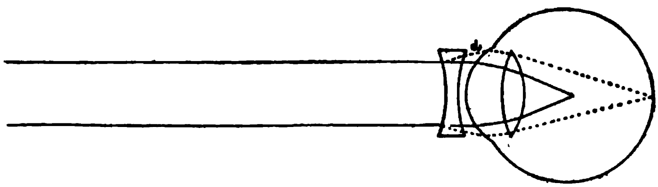


Fig. 93.—Same myopic eye as shown in Fig. 90. A concave glass placed before the eye tends to disperse (*d*) the rays of light, so that now they (dotted lines) are directed farther backward, thus focusing on the retina.

card for distant vision will betray myopia (near-sight), and those cases of hyperopia (far-sight) in which accommodation is insufficient to overcome the defect, but it does not distinguish these defects one from the other. It has already been stated that the test will not betray hyperopia, if the child's accommodation be strong enough to overcome it.

TEST I. THE DETERMINATION OF THE NEAR POINT.—The location of the "near point" indicates whether the defect is due to hyperopia (far-sight) or myopia (near-sight). The "near point" is the nearest situation to the age from which an object point which can be focused on the retina by the lens and cornea can be discerned accurately, and marks the limit of accommodation. We know that in the standard (emmetropic) eye the near point gradually recedes with age, due to gradual weakening of the accommodation, corresponding at different ages to the following table:—

Year	Near point
Under 10 years	?
" 10 "	7 cm. or 3 inches.
" 15 "	8.5 cm. or 3.5 inches.
" 20 "	10 cm. or 4 inches.

The test consists in the determination of the near point of the eye examined, and then its comparison with the known near point of a standard emmetropic (normal) eye. A near point *farther away* from the eye than it should be at the age of the person examined indicates hyperopia ("far-sight"[1]). A near point *closer* to the eye than it should be at the age of the person examined indicates myopia ("near-sight"). This is clear from the following illustrations.

The child is seated so that a good light falls over his shoulder upon the test card (Fig. 94) held in front of him. One eye is covered as the other is tested. The card is held in front of the patient either mechanically or by the examiner. The child selects the smallest type which he can readily read, and reads it aloud slowly as the card is moved (slowly) closer

[1] A certain confusion popularly exists as to the meaning of the terms "far-sight" and "near-sight." Persons with normal vision are wont to claim to be "far-sighted," whereas it should rather be said that they possess acute vision. Similarly, those with defective vision frequently believe this to be "near-sight." It is easily understood that defective vision may be possessed by any variety of refractive error when one remembers the general blurring produced on the stereopticon screen by the operator as he fixes the focus alternately in front and behind the screen in his endeavor to locate it exactly. Technically, far-sight is synonymous with hyperopia and signifies that a person can see far objects (but not near ones). Similarly, near-sight is synonymous with myopia and signifies that the person possessing it can see near objects (but not far ones).

to his face. When the letters become hazy and indistinct, the distance between the card and the eye is measured, and recorded.

Test II. The Lens Test.—To distinguish hyperopia from myopia a ready test of fair practical utility is to place on the child a pair of moderately convex glasses, since convex lenses are used to correct hyperopia. An improved distant vision (the test

D-0.75

C O O	L E E	O L D	E L F
F E E	C O D	L E T	T O D
O D D	E E L	T O O	O F F
E L L	D O T	F O E	C O T

D-100

L E E T	C O L T	L O F T
F O L D	F E E D	D E L L
T O L L	T O L D	F O O L
D O L E	F E L L	F L O E

Fig. 94.

card, say, at 20 feet distance), or the same vision with less effort, is presumptive that the case is one of hyperopia.

A convex lens placed in front of a myopic eye will make the vision worse.

Faulty Formation of Focus—(Astigmatism).

Definition.—In this condition one or both of the refracting substances (cornea and lens, but usually the cornea) have a

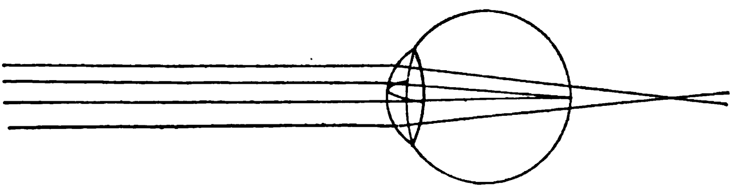


Fig. 95.—Astigmatic eye. The rays passing through the horizontal meridian focus correctly on the retina, but the rays passing through the vertical meridian focus behind the retina.

different curvature in different meridians (diameters) and no image is formed anywhere. Starting from an object point the rays in each diameter make an independent focus, and the effect is a nebulous spray of light rather than a clear image point.

This is illustrated in Figs. 95 and 96, in which it is assumed that the astigmatism is in the cornea, and the lens is disregarded for the sake of simplicity.

In estimating the degree of astigmatism the ophthalmologist ascertains both the most anterior and the most posterior of these minor or independent foci. The light is scattered between the two. He also ascertains the particular diameter or meridian in which the rays forming each of these two foci pass through the cornea and lens. Possibly one focus will be on the retina and the other will lie either in front or behind it. Possibly both foci will miss the retina and either may lie in front or behind it.

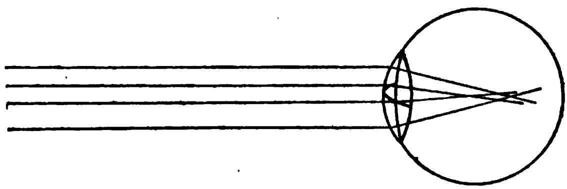


Fig. 96.—Astigmatic eye. The focus of the rays in the vertical diameter is in front of the retina. The focus of the rays in the horizontal diameter is still farther in front of the retina.

Remembering that hyperopia and myopia refer to the location of the focus, and that astigmatism refers to its sharpness or quality, it may be seen that hyperopia or myopia may exist without astigmatism, but that astigmatism is necessarily hyperopic or myopic in character, since the faulty rays of light are falling elsewhere than on the retina—either behind or in front of it.

Thus there are five varieties of astigmatism:—

Variety of astigmatism	Focus from rays in one extreme diameter	Focus from rays in the other extreme diameter
Simple hyperopic astig.	On retina.	Behind retina.
Compound " "	Behind retina.	Behind retina.
Simple myopic "	On retina.	In front of retina.
Compound "	In front of retina.	In front of retina.
Mixed "	In front of retina.	Behind retina.

Symptoms.—Generally speaking, the symptoms of astigmatism are simply discomfort when using the eyes, and headaches

often of severe degree. This is explained by the fact that the astigmatic eye does not focus all of the rays coming from a point at one time, but only those in certain meridians. The subject while gazing, unconsciously constantly changes his focus in order to get the rays of one meridian or axis, and then the rays of another, so as to form the complete image in his mind. This constant varied effort soon tires the eye.

Fortunately the patient with astigmatism and its headaches can easily have the diagnosis made, and is therefore less puzzling to the general practitioner than the one who has headaches from latent hyperopia (see page 231).

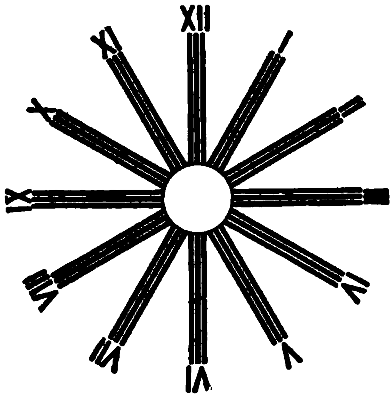


Fig. 97.

The Test for Astigmatism.—The astigmatism chart most commonly used (there are several varieties, but they all depend on the same principle) is of the clock-dial variety shown in Fig. 97, and is constructed with 12 meridians, each consisting of 3 lines and interspaces of equal width. The correct distance at which the chart should be placed is usually stated on the card, but if not it is well to note that if the total meridian (3 lines and 2 interspaces) measures ⅓ inch (8.5 mm.) in width, the chart should be placed at 20 feet distance. If the meridians each measure ¼ inch, the chart should be placed 15 feet distant.

To conduct the test, hang the chart perfectly flat, on a level with the child's eyes, at the proper distance and with good illumination. Each eye is tested separately as in the preceding examination.

If one diameter appears darker than the others, astigmatism is present. If the 3 lines in the diameter fuse together into 1 solid black line, the astigmatism is of considerable amount.

Muscular Insufficiency.

Preliminary Considerations.—Six muscles move the eye at will in various directions. They are spoken of collectively as *extraocular muscles* because they are in the orbit or eyesocket *outside* the eyeball. In distinction to these the ciliary muscle *inside* the eye, which changes the curvature of the lens by the act of accommodation, is known as the *intraocular* muscle.

The movements of the six extraocular muscles are controlled by three of the cranial nerves. The internal rectus, superior rectus, inferior rectus, and inferior oblique muscles are supplied by the third cranial (oculomotor) nerve. The superior oblique muscle is supplied by the fourth cranial (patheticus) nerve. The external rectus muscle is supplied by the sixth cranial (abducens) nerve. The *internal* rectus muscle is the strongest because it is constantly used to pull the eyes (*i.e.*, the fronts of the eyes) *inward* toward each other when they are used for reading or other close work. The third nerve is the largest and most important because it governs four muscles.

The voluntary movement of the eyeball to any desired position and the subsequent maintenance there of this position is known as *fixation* of the eyeball. It is accomplished by the combined action of the six extraocular muscles, which, being attached at various places above and below to the inner and to the outer sides of each eyeball, tend to neutralize each other's efforts.

The maintenance of equilibrium by the extraocular muscles is called *muscle-balance.*

Definition.—Muscular insufficiency is the lack of proper relation of the two eyes toward each other during the act of vision. The muscles do not balance well and the eyeball tends to turn in the wrong direction. It is evident that muscular insufficiency is essentially different from refractive error (hyperopia, myopia and astigmatism), in which each eye is considered separately and independently.

Two degrees of muscular insufficiency exist. In the first the tendency of the eyeball to turn out of its proper axis is successfully resisted by more or less effort. This condition is termed *muscular weakness*. In the second the eyeball actually turns in the wrong direction and appears to be looking at some other object than the one actually viewed. This latter condition is termed *squint*, or *strabismus*.

Muscular Weakness.

Causes.—(1) The causes of muscular weakness are hyperopia, which is the most frequent cause of actual squint, and will be discussed in connection with the latter; (2) overuse of the eyes, which calls excessively upon the internal rectus muscle to converge the eyes toward each other, and (3) poor general health, in which condition the extraocular muscles suffer in common with the rest of the body and the weaker ones become exhausted.

Prevalence.—It is difficult to estimate the prevalence of muscular insufficiency in children. It is usually a defect of adult life, due to the long-continued operation of the causes just mentioned. Children as a rule do not use the eyes as continuously as clerks nor suffer from the same degree of anemia and nervous exhaustion as broken-down women. Dr. H. Maxwell Langdon informs me that muscular weakness sufficient to require treatment exists in about 10 per cent. of all cases (children and adults) seen in private practice. In the domain of school inspection the condition does not require special study, since, if the weakness be sufficient to cause occasional squint, it betrays itself to any observer; while, on the other hand, it gives rise to fatigue symptoms. These are practically the same as the symptoms arising from refractive error, and are therefore sufficient cause in themselves to warrant sending the child to an oculist.

Symptoms.—The symptoms complained of by the sufferer from muscular weakness are much like those resulting from refractive error. In addition, however, to the headache, tiring of the eyes not to be distinguished from those caused by hyperopia and by astigmatism, there is frequently experienced a "drawing feeling" caused by a spasm of the internal rectus muscle from fatigue, and also at times dimness of vision or

transient double vision. The sufferer states the existence of the latter occurrence by saying that "at times things appear double for a moment," or when reading that "the words appear to jump" or appear like German text, or the whole line of type becomes double. The phenomenon is easily obtained experimentally by anyone who presses lightly on the outer side of his eyeball while looking at printed matter, and is due, of course, in each case to the involuntary turning of the eye from its proper axis.

Test for Muscular Weakness.—When muscular weakness

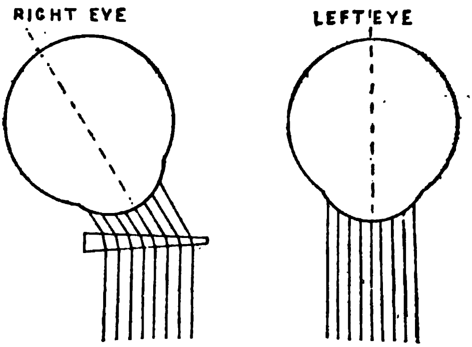


Fig. 98.—Pronounced muscular weakness in the right eye. Rays of light are refracted by a prismatic glass so that they strike the cornea correctly. (The deviation of the eye from its axis is exaggerated.)

exists in considerable degree it approaches the condition of actual strabismus and the position of the eyeball is maintained with so much effort that at times the weaker muscles may relax and an evident momentary squint result. The "cover test" will demonstrate this condition. The examiner holds a pencil point directly in front of the patient, on a level with his eyes, and about two feet distant. The latter is told to look at it intently. One eye is then covered with a small card for a moment. During the quick withdrawal of the card the examiner observes whether the eyeball just uncovered is turned out of position and is compelled to move round to fix upon the object point. Such an occurrence indicates that the eye has been resting in this position

and that the act of proper fixation is accomplished only by effort.

Treatment.—The simplest treatment of muscular weakness is by general tonic and hygienic measures, by eye-glasses for hyperopia if it exists, and by special exercise of the weakest extraocular muscle, usually performed by following certain motions of the finger with the weak eye as specifically prescribed in each case by the attending physician. If these fail to restore good muscle-balance the eye is allowed to retain the position most comfortable to it and good vision in the eye obtained by the use of a wedge-shaped or prismatic eye-glass which refracts rays of light slightly to one side, thus making them enter the faultily placed eyeball so as to hit the posterior pole correctly. These glasses are generally termed "prisms."

Squint, or Strabismus.

Definition.—By strabismus, or squint, is meant such a faulty position of the eyeball that it is turned out of its proper axis. The most common form is internal squint, or "crossed eye," in which the eye is turned in toward the nose. There is also external squint, and more rarely upward squint and downward squint. The term strabismus is preferable to squint, since the latter is also used to denote the puckering or partial closure of the eyelids caused by the glare of bright sunlight.

Cause.—Although squint may be caused by head injury, by meningitis, or by direct nerve paralysis, or by blindness, there exists an erroneous popular impression that most cases arise in this manner. As a matter of fact, the commonly occurring internal squint or "crossed eye" is simply due to eye-strain of the ordinary hyperopic variety, and the less frequent external squint is usually due to myopia. Internal squint due to hyperopia includes probably 95 per cent. of all squint cases, and, since its occurrence signifies neglected eye-strain with an often incurable result, it is worth while to explain, at this time, the manner of its causation. When the normal eye looks at a near object point, two simultaneous events take place. One is the act of accommodation by which the lens becomes more convexly curved, the focus of the image point is brought forward, and

thereby successfully placed exactly on the retina. The other is the turning-in (convergence) of the two eyes toward each other so that both may be directed at the object. If the reader will hold his finger three inches in front of his nose and then look at it he will appreciate the last-described occurrence. Hence *accommodation and convergence are constantly associated acts* and there is a *strong instinctive tendency for the eyes to converge*

Fig. 99.—Internal squint.

whenever a strong effort of accommodation is made. Such a strong effort is made by the defective hyperopic eye. In actual life the tendency to squint usually first manifests itself when the child at the age of 3, 4 or 5 years begins to handle objects and look at them closely. The squint is at first transient, and often exists, for a while, in both eyes, although seldom in both at the same time. Finally it appears in one eye only and remains permanently. The eye affected is almost always the one with the poorer vision, nature discarding it for this reason. Vision soon becomes dulled in the squinting eye, so that inability to read

even the larger test letters frequently results. The eye is useful for recognizing larger objects, however.

Prevalence.—Internal squint is most common in the first school grade, because eye-glasses are not provided, as a rule, until after that time. The cure effected in many instances by the glasses reduces the number among the older children. Squint is also more prevalent among the children of the poor, as it is essentially a defect due to neglect. Probably 3 to 6 per cent. of children in the first grade present temporary or per-

Fig. 100.—Internal squint in one child and external squint in the other.

manent squint. In the higher grades 1 to 2 per cent. is a maximum proportion.

Symptoms.—Squint gives rise to no subjective symptoms such as headache and double vision in its possessor, because vision has been suppressed in order to prevent these very phenomena. He is usually conscious of poor vision in the squinting eye. Objectively the existence of squint is usually evident to anyone (Fig. 100). The test card reveals defective vision, often of marked degree.

Treatment.—The reader will remember that only the ordinary internal squint is here considered. Furthermore, the methods and results of treatment vary with the duration of the squint and with the age of the child.

If taken early, say at the age of 3 or 4 years, the correction of the hyperopia causing the squint will correct the latter without special treatment.

At a later period, say at 6 or 7 years, more vigorous measures are necessary. Not only must the proper eye-glasses be worn, but the child must be forced to use the squinting eye in order to exercise the extraocular muscles and the optic nerve, both of which have weakened from disease. To this end a dark glass is worn before the normal eye, and if this measure fails, by reason of perversity or carelessness, the normal eye may be bandaged.

In older children and in adult life nothing but an operation will restore the squinting eyeball to the straight position, and this is purely for the improvement of the facial appearance. *The vision cannot be improved.* The optic nerve and the visual brain cells are undeveloped from disuse.

THE NOSE AND THROAT.

ANATOMICAL CONSIDERATIONS.

The upper respiratory region consists of the nose, mouth and pharynx. Teachers are reminded that the *pharynx* is the cavity communicating with the mouth and nose in front, and the esophagus and larynx below. Its walls are composed of fibrous and muscular tissue. It may be likened to a bag the mouth of which is held open at the top by bony attachments to receive food and which narrows down below to a tube (the esophagus), the latter in turn transmitting the food to the stomach. By the *throat* is meant the lower part of the pharynx (below the level of the palate) and the upper end of adjacent larynx and esophagus. The *palate* is the roof of the mouth and floor of the nose, the *soft palate* being composed of muscle, connective tissue and epithelium covering the *hard palate* (bone). The familiar little mass of tissue hanging from the back of the palate is the *uvula.* The region where the posterior end of the nasal cavity communicates with the pharynx is appropriately termed the *nasopharynx* and it is here where adenoid growths, when they exist, are found.

Inspection of Fig. 124, showing a side view of the nose, mouth, and pharynx, reveals a fact probably surprising to most readers, namely, that the occipital bone is above the pharynx, and the vertebral column just behind it.

The middle ear communicates with the throat by means of the Eustachian tube, whose orifice is on the side wall of the pharynx, about one-third of an inch from its hind end and slightly above the level of the hard palate. A recess found here is known as Rosenmueller's fossa. Certain differences which exist in the relative positions and size of the posterior opening of the nose, the orifice of the Eustachian tube and the pharynx in the infant from those of the adult are worthy of mention, since these differences predispose to the growth of adenoids and the secondary involvement of the ear. Thus in early infancy

the posterior opening of the nose measures but one-fourth inch in height and one-third inch across both nostrils, such remarkably small diameters rendering it very liable to obstruction. The orifice of the Eustachian tube is situated on a level with the palate instead of just above this level, and this lower location gives a more horizontal direction in the tube itself as it passes outward, explaining the secondary infection of the ear so frequently seen in children suffering from adenoids. Finally the whole pharynx, while almost as long ($1\frac{2}{3}$ inches) as it is in a child of 12 years, is extremely low, so that instead of appearing in a profile section as a high attic behind the nose it scarcely exists at all. The nasal cavity and the pharynx increase in height rapidly from birth until the age of 6 months, so that the posterior nasal opening becomes double its original size and the pharynx is much higher to its roof. This region is rich in blood-vessel supply and in lymphatic tissue, the latter being described in the next paragraph.

A certain form of connective tissue is termed *lymphoid* tissue because it is composed principally of packed masses of small, round cells known as lymphocytes, and because it is found along the course of the lymphatic system. This lymphoid tissue, the aggregations of which are known as lymphatic glands, is found generally through the body, but particularly where it can act as a filter and destroyer of bacteria in regions exposed to infection. Thus the lymphatic vessels of the mouth, arm and leg drain into clusters of lymphatic glands situated in the neck, armpit and groin, respectively, whose soreness and swelling are a familiar experience when a sore throat, vaccination on the arm or infected wound of the foot occurs. Similar lymphatic glands in the chest and abdomen filter and kill bacteria invading the lungs and intestines. Inflammation of a lymphatic gland is known as adenitis and in the neck this is known as *cervical adenitis* (see dictionary).

Certain masses of lymphoid tissues the existence of which is apparently purposeless are found in the upper throat. They consist of the well-defined *tonsils* on either side, a small patch on the upper surface of the tongue back at its base, and another patch on the roof of the pharynx. The latter two are sometimes called the lingual and pharyngeal tonsils, respectively, and it is

because the pharyngeal tonsil exists in every one that its overgrowth (the so-called adenoid) is so common. Rather curiously it will be noticed that this lymphoid tissue is thus disposed on the roof, floor, and sides of the throat entrance, making an incomplete ring around it.

It has been suggested by some writers that the four tonsils are vestigial structures, like the vermiform appendix and the coccyx. A fourth suggestion has been made (see enlarged tonsils) that their function is (or was) to aid in excretion in case of the overcharging of the system with poisonous substances.

The tonsils are situated at the junction of the mouth and the pharynx, and implanted between two small muscles extending vertically and standing out like bands, plainly visible to the observer. These muscles pass down from the palate, one (palatoglossus) in front of the tonsil to the tongue, and the other (palatopharyngeus) behind the tonsil to the pharynx. They are frequently termed, respectively, the anterior and the posterior pillars. Each tonsil is covered by mucous membrane and possesses normally a pale pink color and smooth surface. Its base, which is against the wall of the throat, is rather close to the internal carotid artery.

The tonsils are usually plainly visible, although occasionally they are so small and so deeply embedded in the recess between the pillars that inspection is difficult. Choking, gagging, or the voluntary contraction of the throat muscles to produce loud, high-pitched sounds, moves them inward and forward into better view.

ACUTE SORE THROAT.

Simple acute sore throat is considered here as a separate affection because of its frequent occurrence, mild symptoms and rapid disappearance under treatment. It should never be forgotten, however, that an acute sore throat is necessarily a more or less *infected* throat because of the great number of germs always harbored in the mouth.

In recent years it has been proven that some apparently simple sore throats are caused by diphtheria bacilli, and others

by the germ of scarlet fever, the cases, therefore, being really mild instances of these diseases. The realization that ordinary tonsillitis is contagious has also done much to cause us to pay more respect to these milder forms of infection.

Cause.—Simple sore throat is usually caused by indigestion and constipation, by exposure to cold and wet after breathing foul hot air, and by contact exposure to the disease in other children. A chronic congested throat and existing adenoids causing mouth-breathing with the inspiration of cold air are powerful predisposing factors. It cannot be too strongly emphasized that the *hot foul air* and not cold fresh air is the principal and essential cause of sore throat and tonsillitis, and of general infections such as influenza and pneumonia. Cold fresh air is beneficial to a child with a normal nose and throat, and exposure to cold to the point of discomfort is not attended by bad results, unless it is so sudden that the circulation has not time to adjust itself gradually and internal congestion (taking cold) is produced.

Evidence.—The child complains of soreness of the throat and possibly of feeling ill. Some slight fever may be present. The throat on inspection appears inflamed, an angry red color replacing the normal rose pink. Frequently after the first day a quantity of phlegm (mucopus) is present. Questioning as to the condition of the bowels almost always elicits a statement of overeating or constipation.

To examine a child's throat, a tongue depressor may be used, but it is seldom necessary. Without it the child may simply be asked to open his mouth, a procedure which gives a good view of the throat if he does not elevate the base of the tongue by reason of nervousness or voice production. A surer way, which, however, must be carried out exactly, is to ask the child to open the mouth *wide,* put the tongue out *as far as possible,* and say *ah* (pronouncing the a as in *cat,* not as in *star*). To induce a hesitating child to open his mouth, a joking suggestion to take a big bite of pie, and to put the tongue "way out" suffices.

An experienced inspector can examine 100 throats without the aid of a tongue depressor, but occasionally it is necessary. The handle of a teaspoon or a flat wooden stick made for the

purpose and sold wholesale very cheaply, or even a lead pencil, will suffice.

Treatment.—For acute sore throat the principal treatment consists in a dose of salts or castor oil. A simple fever mixture is sometimes prescribed by physicians. Locally various antiseptic washes are used, plain salt-water solution, a teaspoonful to the glass, being about as efficacious as any. Too vigorous swabbing of the throat injures rather than helps it. Following the advice to go home, take a dose of salts ("bitter salts" is the term used by foreigners) and gargle the throat every two hours with salt water, the child is usually well in twenty-four to forty-eight hours. In case of known possible exposure to diphtheria a culture from the throat for bacteriological examination should always be taken to ascertain the exact nature of the disease.

CHRONIC SORE THROAT.

Chronic Pharyngitis (Clergyman's Sore Throat).

Cause.—Chronic sore throat, or chronic pharyngitis, or "clergyman's sore throat" is caused principally by the improper use of the voice, and by the action of irritants. For this reason adults (clergymen, orators, singers and tobacco users) are much more affected than are children. However, the irritation of the throat by cold air incidental to mouth-breathing in children suffering from adenoids, the use of cigarettes by boys, and the lusty and excessive singing of children in volunteer Sunday school choirs produce many cases. In disciplinary schools for bad boys (not from singing) the majority of the boys possess throats showing chronic congestion or actual inflammation.

Evidence.—The child complains of a slight sore throat on arising in the morning, which disappears after unconscious moistening of the throat surface and cleaning out the mucus which has accumulated overnight. Frequent hawking to clear the throat and the expectoration of thick, yellow phlegm is characteristic.

On inspection the back of the throat is quite red and the surface is seen to be dry, glazed and covered with small granular elevations. In old cases distended views give a bluish discoloration. Thick phlegm may cover the surface and temporarily

obscure it from clear view. An increased liability to attacks of acute sore throat and tonsillitis is present.

Treatment.—The treatment is the removal of any nasal obstructions, the discontinuance of tobacco and instruction of the child in voice production so that proper action of the diaphragm will be substituted for improper overuse of the throat muscles.

ACUTE TONSILLITIS.

Acute tonsillitis may be regarded both as a local throat affection and as a general disease, since the general illness attendant upon it is usually sufficient to force the sufferer to bed. Probably nowhere else in the body is infection of so small a structure capable of producing such marked fever and prostration. Without entering unduly into the domain of medical practice it is well to point out the principal causes, diagnostic points and danger of tonsillitis and certainly its prevention.

The causes of acute tonsillitis are, first of all, those of acute sore throat already mentioned, namely, the combined occurrence of constipation, breathing of ill-ventilated air and immediate subsequent exposure to cold and wet. The intoxication of the system, however, may not only be from constipation, but from gout and rheumatism. Unhealthy tonsils, particularly those with irregular surfaces always lodging disease germs, are particularly liable to attack. Contagion is possible from other cases and from cases of simple sore throat. A certain number of very mild diphtheria and scarlet-fever cases are mistaken for tonsillitis by the best physicians, only a bacterial culture proving the diphtheria if it exists.

Evidence.—The tonsils are inflamed, *i.e.*, reddened, swollen, tender and sore. Fever, chills and prostration exist and distinguish it (as diphtheria, scarlet fever, and grippe are also distinguished) from a simple sore throat.

The lymphatic glands of the neck are swollen and tender from secondary infection.

If the follicles or pits in the surface be particularly inflamed (showing as yellow foci composed of cheesy dead epithelium) the disease is termed *follicular tonsillitis.* If an abscess form in the tonsil the tonsillitis is especially termed *quinsy.*[1]

[1] Accurately speaking, the abscess is peritonsillar behind and above.

Without the aid of a culture tube and microscope for bacterial examination, diphtheria is distinguished from tonsillitis by the death of a patch of its surface epithelium, thereby forming a yellowish-gray false membrane which often extends to the adjacent tissue. Scarlet fever is distinguished by its sudden onset with vomiting, the rash, rapid pulse and high fever.

The fact that acute tonsillitis is a general infection in which germ poisons (and frequently germs themselves) have passed into the whole system from the inflamed tonsil should always be borne in mind. Such a general infection causes not only the familiar signs of acute illness, but, frequently, serious complications unsuspected at the time. Chief of these is endocarditis (inflammation of the membrane lining the heart chambers and valves), and this complication is doubly possible because tonsillitis and rheumatism (which is well known to be complicated by heart disease) exist together in some intimate relation. Remembering that enlarged tonsils are almost always the products of chronic inflammation, and that such tonsils pick up diphtheria, scarlet fever and influenza, and also suffer repeated acute inflammations each with a goodly chance of heart involvement, it is reasonable to state and emphasize that *enlarged tonsils cause* (or help to cause) *most cases of heart disease originating during the first twenty years of life.*

Treatment.—The treatment of acute tonsillitis should be in the hands of the attending physician and is therefore not discussed here. It is well to bear in mind, however, the possibility that an apparently simple tonsillitis is sometimes really diphtheria; that the prostration existing and the liability to heart damage demand rest in bed (the cheapest insurance), and that *repeated* attacks of sore throat signify a *permanently diseased* nose or throat.

ENLARGED TONSILS.

(Chronic Inflammatory Hypertrophy of the Tonsils.)

Tonsils may be defective or diseased by reason of excessive size, changes in the structure due to chronic inflammation, irregularities of surface, and acute and chronic infections. Although the diseased condition most commonly met with is loosely

termed "enlargement of the tonsils," the factor of size is really not as important as those of tissue structure and surface regularity, since these decide the liability to throat infections including tuberculosis. Tonsils showing a defective or diseased condition may be conveniently classified into four groups:—

1. Tonsils originally enlarged, of normal structure and not the result of chronic inflammation.

2. Enlarged (hypertrophied) tonsils which are the result of chronic inflammation.

3. Enlarged tonsils which are the result of chronic inflammation and which possess in addition an irregular pitted surface.

Fig. 101.—Enlarged tonsils, showing pitted surface (*Phillips*).

4. Tonsils similar to those of the last-described group, but not of large size.

Enlarged tonsils may be hard or soft, the consistency depending on the amount of fibrous tissue. They may be of such size as to actually touch each other in the midline during the act of swallowing or choking, although such excessive overgrowth is rare. In some cases the surface of the tonsil is normal, but more usually pits or crypts exist in which decayed perverted secretions and bacteria may be lodged. As age advances and the enlargement of the tonsil (which, as has been said, is really a chronic inflammation) becomes of long standing the foundation of fibrous tissue within it results in its shrinkage, producing a tonsil both of smaller size and irregular surface. It is for this reason that the *small diseased tonsil* is more susceptible to infection than the younger larger one, which is provided with a better circulation.

Causes.—All enlarged tonsils, but particularly those whose only characteristic is excessive size, may result from an unusual development of the lymphatic system of the child in which the tonsils have simply shared their part. Such enlarged tonsils are present from birth. The general condition has by some been regarded as a distinct one—"the lymphatic constitution."

The chronic inflammation producing enlarged tonsils results usually from mouth-breathing or (possibly) from certain constitutional conditions in which the body is overloaded with effete substances and forces the tonsil to act as an excretory organ

Fig. 102.—Much enlarged tonsils; almost meeting in midline of throat.

emptying into the throat. Very probably the most common cause is the coexistence of the two conditions just mentioned in which tonsils irritated and depressed in vitality by the poisons of gout, rheumatism or constipation are chronically or acutely inflamed by the currents of cold air due to mouth-breathing or the entrance of bacteria beneath the surface.

The enlarged tonsil possessing an irregular or pitted surface is usually the result of irregular shrinkage in old tonsils with long-standing chronic inflammation.

Tonsils of moderate or small size possessing the diseased irregular surface just described may have been formerly enlarged with much subsequent shrinking. In other cases repeated inflammation with irregular shrinking has taken place in tonsils of normal size.

Enlarged tonsils and adenoid nasal obstruction are frequently associated. It should be remembered, however, that they may exist together from the beginning and that probably either may cause the other.

Prevalence.—The proportion of children of school age suffering from defective and diseased tonsils varies with age and with social (sanitary) environment. Statistics furnished by

Fig. 103.—Large tonsils crowding the pharynx and producing fullness of neck and throat.

medical inspectors naturally do not include tonsils of normal size, but diseased surface, so that they are really minimum figures. The omission, however, is inconsiderable, since the tonsils of the kind just mentioned are found in adults rather than children. It should be remembered also that medical inspectors are not, as a rule, specialists, and necessarily fail to detect some cases either through lack of expert knowledge or by reason of the limited facilities afforded during school examinations. In a general way it may be said that from 6 to 12 per cent. of children suffer from "enlarged" tonsils, the greater number being poor children under 10 years of age.

Evidence.—The methods of examining the throat have been already described (Acute Sore Throat, Evidence). Enlarged tonsils may be easily recognized by anyone, attaining as they do the size of a hazelnut and appearing to block up the throat. Small tonsils of unhealthy structure (which fortunately are less common in children than in adults) require skill for their recognition and frequently the use of a probe, retractor, or other special instrument.

Effects.—The effects of overgrowth of the tonsil may be:—

1. *Obstruction of the Respiration.*—This is inconsiderable except in infants. Ordinarily such obstruction as occurs results from the associated adenoids.

2. *Increased Liability to Throat Infections.*—The pits already mentioned serve as incubators for the germs of tonsillitis, diphtheria and scarlet fever certainly, and probably pneumonia, influenza and meningitis. In the chapter on contagious diseases, cases of diphtheria in children suffering from enlarged tonsils are cited. Here they may lurk until the exposure to cold, indigestion, or the respiration of foul air, provides opportunity for the invasion of disease.

3. *Increased Liability to Heart Disease (Endocarditis).* This has been already discussed in the paragraphs on acute tonsillitis.

4. *Increased Liability to Tuberculosis.*—It has been shown by microscopic examination of diseased tonsils which have been removed that a considerable proportion have been infected with tuberculosis.

One writer, Mayo, reports this proportion to be 80 per cent. From these tubercular tonsils infection may travel, first through the lymph-glands of the neck, causing the familiar swollen and abscessed glands of children and, successively, involvement of the deeper glands, the pleura and the apex of the lung. The thought that tuberculosis may enter the lung directly down the neck from diseased tonsils, adenoids or teeth is more or less revolutionary to those who have become accustomed to the idea that the only sources of infection are through the respired air and through tuberculous food. At the present time medical opinion is not fully agreed as to the relative degree of this influence, some writers emphasizing it because of the many cases showing

this sequence reported by nose and throat specialists and also by reason of the animal experiments of Grober[1] showing deposition in the cervical lymphatics and apex of the lung of sterile pigment injected into the tonsil. On the other hand, it has been asserted that such drainage channels are poorly developed and but slightly active, that the base of the tonsil is of firm resistant material and that other injection experiments[2] have demonstrated that drainage from the tonsil is into the throat from its free surface rather than internally into the tissues of the neck.

The writer inclines strongly toward the view that tuberculosis may enter the system through diseased vessels of the nose and throat. The remarkable frequency in consumptives of signs pointing to previously existing adenoids and the frequent occurrence of lung tuberculosis following tuberculous glands of the neck make such a conclusion irresistible.

The infection of the system by a *diseased* tonsil does not make the supposition that the normal tonsils act as occasional excretory organs unreasonable. The spoiling of appetite by the secretion of excretory matter from the tonsil during a bilious attack for instance would appear to be a sensible natural provision. If such poisonous substance should act as a laxative and so tend to relieve the overloaded system, the act would be doubly beneficial.

5. *Cervical Adenitis.*—Enlarged glands of the neck owe their origin to infection from the mouth and throat. For this reason slowly progressive infection from diseased teeth or tonsils or acute inflammations resulting from scarlet fever, diphtheria, influenza, tonsillitis, and measles are analogous secondary effects.

6. *Indigestion, Poor Nutrition and Lowered General Health.*—The pits or crypts which have been already mentioned as affording a lodging place for particles of decayed food and

---

[1] Quoted by Dr. J. A. Pratt, New York Medical Journal, August 7, 1909.

[2] Barth, Deutche medizinische Wochenschrift, Berlin, xxxiii, No. 49, pp. 20-25, considers the tonsils to be the excretory organs with a lymph-current and secretion flowing *outward to the surface.* Injections of aniline dyes have shown this. A large tonsil signifies that it is excreting an excessive amount of material and if not diseased it should not be removed.

bacteria empty their contents into the throat and are swallowed, giving rise to indigestion and poisoning of the whole system. If it were not for the acidity of the gastric juice, which fortunately kills most of the organisms so received, the results would be much more serious than they are. It is worth noting that these crypts are of greatest size, as a rule, in old tonsils which have been first enlarged and then shrunken. In such case both patient and physician, if the latter be not a specialist, may be unaware of their existence. Such a crypt at its greatest size may measure ½ inch in depth and contain a third to a half teaspoonful of foul material.

7. *Ear Involvement.*—Catarrhal inflammation of the Eustachian tube and middle ear frequently result from large tonsils, although adenoids are an even more potent factor. The immediate influence causing the involvement of the ear are, 1, extension of throat catarrh up the tube; 2, congestion and pressure at the orifice of the tube by reason of the general catarrh and adenoid tissue, and, 3, clogging of the orifice of the tube (which normally is opened and ventilated during the act of swallowing) by adhesion of the palatopharyngeus muscle (posterior pillar) to the enlarged tonsil. Catarrh of the tube and middle ear is discussed in the chapter on the Ear.

Harmful results from enlarged tonsils are observed so frequently in the work of medical inspection that they soon fail to excite comment. Literally 1000 cases might be cited in the writer's official experience, which includes the inspection of 35,000 children. The day previous to this writing a young woman of Poughkeepsie, New York, commenting on her own experience, said, "I had nose and throat trouble all my life. I would have attacks of tonsillitis which would make my tonsils so big that they would touch in my throat. I had mastoiditis when I was a child and was in bed with ice-bags behind my ears. Last spring I had the tonsils taken out and adenoids too. It took the doctors an hour and forty minutes. They said my tonsils were 'stuck fast by adhesions to everything in my mouth, but my teeth.' I certainly feel different now. My hearing is better; I can breathe through my nose; I wear a collar an inch smaller. When I feel of my neck with my hand it isn't hard any more as it used to be."

Treatment.—The treatment of diseased tonsils, whether enlarged or not, is their removal. This is usually and preferably done at one time by a formal operation under ether, but occasionally a weak heart or extreme nervousness and dread of operation indicate removal of part at a time. Complete removal

Fig. 104.—The primary incision for separating the hypertrophied tonsil from its attachments (*Phillips*).

is accomplished with the guillotine instrument (tonsillotome), by choking with a wire snare, and by careful dissection of the whole tonsil away from its base with a blunt instrument. Where deep pits in the tonsil exist, their bases must be bitten out with the tonsillar punch, or else the complete dissection just mentioned must be done.

Removal by partial stages is usually done by cauterization with strong chemical solutions, particularly of chromic acid or of silver nitrate. The dangers of operation, on the one hand, and its beneficial results, on the other, are discussed under the treatment of adenoids, since the two conditions exist together.

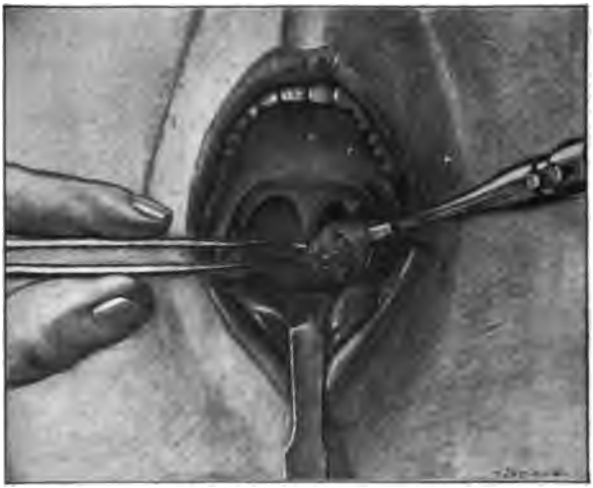


Fig. 105.—The tonsil snare applied to the loosened and evulsed tonsil (*Phillips*).

NASAL OBSTRUCTION.

Nasal obstruction in children may be either temporary (accidental) or chronic in character. Temporary nasal obstruction may be caused by a severe acute cold or by the lodgment of a foreign body. Since, however, children with healthy noses seldom take cold and the pushing of beans, buttons and like objects into the nose by children is really an exceedingly rare occurrence, these paragraphs will be devoted to the consideration of chronic nasal obstruction, and this condition in the case of children is almost synonymous with adenoid nasal obstruction.

It will be remembered that reference was made under *anatomical considerations* to the four masses of lymphoid tissue which for an unknown reason, if any, exist around the circumference of the passageway between the mouth and the throat.

Two of these (one on each side) are the familiar tonsils; the others, the less-known "pharyngeal" and "lingual tonsils" respectively. The enlargement of the pharyngeal tonsil con-

Fig. 106.—Sessile masses of adenoids in the vault of the pharynx (*Phillips*).

stitutes the "adenoid" mass, and the fact that more or less lymphoid tissue always exists in this region explains why the

Fig. 107.—Adenoid nasal growth; hard, fibrous variety (*Phillips*).

existence of "adenoids" when the latter are small is largely a matter of judgment on the part of the examiner.

Adenoids, when they exist, may attain varying sizes up to that of an olive, and, in the latter case, may block up the posterior opening into the pharynx. The fact that adenoids,

when they exist, do not necessarily obstruct the posterior nasal opening should be remembered.

Adenoid tissue is of varying consistency, being ordinarily soft, spongy and very well supplied with blood-vessels which bleed readily. If the adenoid mass is congested by a sluggish circulation it is swollen and of a pulpy or jelly-like consistency. Sometimes the mass is quite firm because of the presence in it of tough fibrous tissue, and this is particularly true of old adenoids existing in children over 7 years of age. Such firm adenoids frequently present a surface which is irregular with deep furrows and longitudinal ridges like a sweetbread.

Adenoids may appear as early as infancy. They often become quite evident by the third or fourth year and reach their maximum at the age of 6 or 7; at 10 the masses begin to shrink considerably with a corresponding lessening of the symptoms.

The association of adenoids and enlarged tonsils (which are really the product of chronic inflammation) has been already mentioned. Most cases of enlarged tonsils show adenoids also and about one-third of adenoid cases show enlarged tonsils.

Causes.

It is possible for the lymphoid tissue of the throat region to be superabundant at birth, so that it may occur rarely that adenoids exist from this time. Almost always, however, they originate from certain unhealthful conditions existing during the first three years of life. Certain it is that they occur with remarkable frequency among the children of the ignorant poor, giving rise to the theory that either poor nutrition (possibly this in turn signifies rickets, starvation and latent tuberculosis) or the overloading of the system with effete products due to improper diet,[1] causing flabby, relaxed tissues, or irritation of the nose and throat by foul air in ill-ventilated rooms, is an active causative factor. Thumb-sucking in infancy or the use of a "pacifier" is claimed by many to enlarge the lymphoid tissue of the throat region simply by suction on all the tissues. Finally may be mentioned the so-called "lymphatic constitution"

[1] The excessive use of sugar has been stated to be a cause of adenoids by Kerley.

as a cause of adenoids, the lymphoid tissue in this case being present at the time of birth not as a local accident, but as a part of a general overgrowth of the lymphoid tissues throughout the

Fig. 108.—Burk School, Philadelphia—69 cases adenoid nasal obstruction.

body. This constitution, as it is described by those who believe in its occasional existence, is found in persons with blond complexions, usually red hair, an emotional temperament and great susceptibility to shock.

Fig. 109.—Same group, nearer view.

Prevalence.

Leaving the remarkably differing figures quoted by different writers and the discussion thereon to the chapter on the Prevalence of Physical Defects, it is well to remember that nasal obstruction of sufficient degree to be noted by school inspectors

and to warrant official notice to parents exists in from 6 to 25 per cent. of school children. The proportion is greater among the poor and the young, and diminishes with age (after 10 years) and increasing affluence. The maximum figure for the well-to-do is 12 per cent., and this is also the minimum figure for the prevalence among the poor.

Fig. 110.—Same group, selected cases, nearer view.

Evidence and Effects.

Nasal obstruction existing at the time of the child's physical examination is easily shown by asking the child to breathe through his nose. Curiously enough, this simple request is usually imperfectly understood by children and time is saved by showing the child in pantomime what is expected. "Take a deep breath like this;" "that is right; now shut your mouth" (then gently press one nostril closed, then the other, while the child is breathing deeply). Instead of complete obstruction there may be partial obstruction evidenced by a hissing or whistling sound through the nose.

Obstruction of the nose in children may be caused by large adenoids, by small adenoids plus an acute cold in the head, by a simple acute cold in the head, by nasal polyps, by a deflected

nasal septum, by injury to the nose, or by the lodgment of a bean or other foreign body, or by nasal diphtheria. Ordinarily nasal obstruction is by far the most frequent form and is the only one here considered.

The diagnosis of adenoids is made because of the existence of certain symptoms and secondary effects rather than on the actual demonstration of the mass itself. This is so because the symptom group just mentioned is practically unmistakable and because the viewing or feeling of the adenoids is a disagreeable proceeding to a child.

Absolute proof of the existence of adenoids is obtained by exploring the upper pharynx behind the posterior nasal opening with the finger, in which case they may be felt as thick, irregular, spongy masses. Medical specialists also use a reflecting throat mirror. Such procedures are seldom followed even by surgeons previous to actual operation under ether.

The physical signs by which the existence of adenoids is known may be classed into three groups. The first of these consists simply of the immediate effects of nasal obstruction, even though said nasal obstruction be recent and temporary. The second group comprises those effects which follow the existence of adenoids frequently, and which seldom owe their origin to other cause. The third group is composed of certain defects which occur from adenoids frequently enough to call forth a suspicion of their accompanying existence, but which, on the other hand, may result from causes other than adenoids.

Group 1. Immediate Effects of Nasal Obstruction.

1. *Mouth-breathing.*
2. *Nasal catarrh.*
3. *Depressed mental activity from lack of air.*

Group 2. Defects which are the Characteristic Results of Adenoids.

1. *Mouth-breathing by day and mouth-breathing and snoring by night.*
2. *Chronic nasal catarrh.*

3. *Secondary catarrh of the middle ear,* causing defective hearing and a liability to acute inflammation. Remembering that the statement is necessarily made on individual judgment, it has been found that three-fourths of all adenoid cases suffer in some degree from defective hearing.

4. *Swollen bridge of the nose* due possibly to blocked air expiration is quite characteristic (see illustrations). When the

Fig. 111.—Adenoid nasal obstruction.

nasal passage is completely occluded by the adenoid growth, and the nasal chamber small because of its high palate floor and its lack of growth from disuse, then the nostrils are small and narrow. If the obstruction be only partial and occasional, the nostrils are frequently very large because of their unconscious dilatation in the search of more air and because of the irritation and picking of the nose due to catarrh and indigestion.

5. *High Narrow Palate.*—The mechanism of the production of this deformity is worthy of explanation, since it was taken

by Lombroso for an original sign of degeneracy rather than a simple effect of nasal obstruction. The normal child breathing through his nose, with closed mouth, presses his tongue constantly upward against the palate, the pressure being particularly strong along the sides. By this means the growth of the palate is directed laterally and the dental arches (which bear the teeth) are spread wide apart. On the other hand the child with

Fig. 112.—Adenoid nasal obstruction.

nasal obstruction breathes through his mouth, the tongue dropping away from the palate and failing to exercise the normal lateral pressure. The jaw, once dropped down, the cheeks actually press inward upon the bicuspid and molar teeth, and the dental arches are pressed inward rather than outward. The growing palate, lacking room to expand, buckles upward, causing the "church roof" deformity. A small nasal cavity and a nasal septum pushed over to one side are secondary results. In this way the nasal obstruction becomes more or less permanent even if the adenoids be removed. (See also page 315.)

6. *Irregular Projecting Teeth.*—The dental arches, forming the two sides of a triangle rather than a semi-ellipse, do not possess sufficient space for the teeth to arrange themselves properly side by side. The front teeth being the lighter and the last to appear are crowded forward (see illustrations in the chapter on the Teeth).

7. *Poorly Developed Upper Jaw.*—This deformity is explained in the last two paragraphs. It gives rise to the projection of the *lower* jaw so that the so-called "lantern jaw"

Fig. 113.—Adenoid nasal obstruction.

(prognathous jaw) and prominent chin result. A child possessing such a deformity when smiling shows the well-known *dish face.* In the figure showing the group of children just returned from an outing furnished by the New York Health Department four such faces may be seen.

8. *Chronic Inflammation of the Throat (Granular Pharyngitis).*—The continued mouth-breathing irritates the posterior wall of the throat so that gradually a reddened surface studded with small granulations is seen (see Chronic Sore Throat).

9. *Thick catarrhal voice* of a "wooden" quality and lacking resonance. The letters *m* and *n* become *eb* and *ed.* "Sprig is cobig" (spring is coming) is the time-honored illustration of this condition.

10. *Dull, Apathetic Facial Expression.*—This is due to the mental dullness which in turn causes a poor nervomuscular development particularly of the muscles of facial expression. The accompanying photographs show this vacant, listless appearance which, coupled with the open mouth, comprises the most characteristic sign of adenoids.

Fig. 114.—Adenoid nasal obstruction.

Group 3. Diseases and Defects very Frequently the Result of Adenoids, but Possibly Arising from Other Causes.

1. *Stoop Shoulders and Flat Chest.*—This may be caused by leaning forward to see, leaning forward to hear, by lack of nerve energy and by poor nutrition. Since adenoid nasal obstruction produces all but the first of these, it is evident that it is the most powerful agent in the production of this deformity. Inspection of a group of children suffering from adenoids shows probably a majority of them so affected. The accompanying illustrations verify this statement.

2. *Conjunctivitis.*—The nasal catarrh caused by adenoids may affect the tear ducts in a manner similar to that by which it often causes catarrh of the middle ear. In such cases the tear ducts, swollen shut, prevent proper drainage of the tear secretion into the nose, and bleary, watery eyes result. The writer is reminded of one school boy suffering from adenoids who had attended an eye dispensary for some time and received local

Fig. 115.—Adenoid nasal obstruction, showing swollen bridge of nose.

eye treatment without the physicians in charge recognizing that cure of the conjunctivitis lay in the treatment of the coexisting nasal obstruction and nasal catarrh. A picture of such a case is shown here and both the swollen eyelids and characteristic adenoid expression are easily recognized.

3. *Frequent Acute Inflammations of the Throat.*—The increased liability to tonsillitis, diphtheria, and scarlet fever has been already mentioned in the paragraph discussing the effects of enlarged tonsils.

4. *Acute inflammation of the middle ear,* often resulting in abscess and rupture of the drum. Many of these cases fail to heal because of the poor circulation and blocked drainage of the middle ear and Eustachian tube, and chronic *discharging* ears result.

5. *Nosebleed* is a frequent effect of adenoids because of the loose, spongy quality of the diseased lymphoid tissue.

Fig. 116.—Adenoid nasal obstruction, showing swollen bridge of nose.

6. *Cervical adenitis,* inflammation of the glands of the neck, is caused principally by drainage into them of material from diseased tonsils, diseased teeth and from adenoids.

7. *Indigestion* from swallowing of catarrhal mucus.

8. *Nervous disorders* resulting from reflex irritation. These include headache, restlessness at night, with disturbed sleep, wetting of the bed, chorea (St. Vitus's dance), habit-spasm and even epilepsy. Hay fever and general nervous exhaustion may also result, but not so commonly as in adults. The habit-spasm

when it occurs usually affects muscles in the neighborhood of the nose and throat, so that twitching of the lips, grinding of the teeth, twitching of the muscles of the neck, and shrugging of the shoulders are the effects most commonly seen. Apropos of epilepsy as a possible result of adenoids, cases are occasionally quoted in the medical journals in which the removal of the

Fig. 117.—Group of New York school children who had previously suffered from adenoid growths. These children were operated upon and sent to the country for two weeks, and are now returning improved in health. The cases marked with a cross + also show, when smiling, the broad bridge of the nose and sunken, vacant mouth often resulting from adenoids. (Courtesy of Dr. Thomas Darlington and Dr. John J. Cronin.)

adenoids has cured the epilepsy. While believing that to be perfectly possible, it must be conceded that such cases must be mild and not of long standing. An interesting illustration of the tendency of specialists to overlook diseases outside of their own province was seen by the writer at one of the leading hospitals of Philadelphia. The professor of nervous diseases had in his ward a young man suffering from epilepsy on whom it was proposed to perform an operation consisting in the bring-

ing of the vermiform appendix to an opening in the abdominal wall, so that irrigation of the larger intestine might be regularly done with a view to reducing intestinal toxemia. This young man, while undoubtedly suffering from chronic indigestion, presented one of the most pronounced cases of adenoids that I

Fig. 118.—Stoop shoulders resulting from nasal obstruction.

have ever seen, and these were entirely overlooked, at least as to their effect, by both the neurologist and the surgeon. Common sense would have suggested a first attempt to cure the dyspepsia by the minor operation of removal of the adenoids and tonsils.

9. *Poor nutrition,* which includes *rickets, anemia,* frequently results from adenoids by reason of indigestion, lack of air, difficulty (in infancy) in sucking and swallowing, and reflex nervous irritation. The condition of poor nutrition is evidenced by lack

of flesh and strength, anemia and, at times, by eczema, by nervous spasmodic coughing, by phlyctenular conjunctivitis (*q.v.*), and by the various bony deformities characteristic of rickets, other than the stoop shoulders and flat chest already mentioned.

10. *Increased Liability to Tuberculosis.*—The infection of the cervical lymphatic glands and lungs has been already mentioned in the paragraphs bearing on the effects of enlarged tonsils. A considerable proportion of all adenoids removed (one-

Fig. 119.—Adenoid nasal obstruction, with secondary conjunctivitis.

sixth?) have been found by microscopic examination to be tuberculous.

11. *Defective* (*articular*) *speech* is common in young children suffering from adenoids, and is often so marked as to be almost unintelligible. This is principally due to inability to produce certain sounds, but partly to lack of appreciation of the difference in sounds due, in turn, to deafness or mental dullness. *Stammering* may result from the combined influence of general nervous weakness and local reflex irritation, and is really one of the habit-spasms already mentioned, since it results from spasmodic action of the diaphragm.

12. *Eye-strain.*—This effect is problematical and unproven,

but deserves passing mention because of the insistent statements of reputable specialists that the persons whose adenoids have been removed frequently require changing of their glasses afterward. Whether the adenoids simply depress the general health and cause thereby a low tone of the ocular muscles, or whether by actual pressure outward of the walls of the nose, the curvature

Fig. 120.—Adenoids, with nervousness.

of the eyeball is changed is not known. It would seem, in the latter event, that myopia results, and, as this is rare in young children, the assertion is capable of proof or disproof by an investigation of the eyesight of children suffering from adenoids.

13. *Lowered Scholarship.*—Adenoids are very likely to be associated with dullness and even with mental deficiency simulating feeble-mindedness. The causation of the poor mentality is apparently by poor air supply, poor nutrition, and defective hearing, all of which have just been mentioned. It is quite

characteristic of children with adenoids to sit for some time quietly in apparent apathy, oblivious to the movements of the children around them. This condition has been termed *aprosexia nasalis*. It is said that adenoids may cause outbreaks of temper and acts of crime, but the evidence is shadowy. A number of boys have been operated upon by order of the juvenile court with no apparent change in disposition. It is true that the removal of the adenoids may remove nervous irritation and improve the general health, so that the attempt is certainly reasonable.

On the other hand, it should be remembered that certain children suffering from adenoids are good scholars. Possibly in their case poor nutrition and deafness have failed to result and a sufficient amount of air has been respired through the nose or mouth. In the feeble minded, adenoids are exceedingly common, but they are the result rather than the cause of the condition, being due to the characteristic loose, open mouth with consequent irritation of the throat and pharynx by cold inspired air.

The prevalence of nasal obstruction among the dullards of the school population is evident from four studies in different schools at different times by the writer, three of which have already been published. They are here briefly recorded.

An exhaustive investigation of 44 school children of very low mentality living in the poor foreign section of Philadelphia showed 31 to be suffering from nasal obstruction. It should also be stated, however, that physical defects were numerous and diverse, since 12 cases of defective vision, 9 cases of discharging ears, 27 cases of poor nutrition, and 16 cases of nerve asthenia were also found, and the summary showed that but 3 of the children were free of some one or more of these 5 defects. Home visitation by the school nurses also showed that the environment in 9 cases was absolutely improper, and the family or personal medical history of 13 was sufficient to reasonably account for the mental defect existing.

Another investigation[1] in the Claghorn Grammar School of Philadelphia consisted in a comparison of the physical condition of the two brightest classes and the two dullest classes of the sixth and seventh grades. These classes had been purposely so

[1] "Backward Children in the Public Schools," F. A. Davis Company, Philadelphia.

made up by the principal, Mr. Dudley, for the sake of better teaching. In the two classes of bright children 12 per cent. and 10.2 per cent., respectively, of the children suffered from nose and throat defects. In the two classes of dull children 28.1 per cent. and 31 per cent., respectively, of the pupils suffered from these defects. It so happened in these classes that the eyesight standard averaged exactly the same in each class ($\frac{5.26}{6}$, $\frac{5.41}{6}$, $\frac{5.3}{6}$, $\frac{5.08}{6}$), so that this factor was fortunately eliminated.

The following table shows the findings:—

	Bright children		Dull children	Dullest children
	Class 1	Class 15	Class 9	Class 11
Number of children	50	39	32	29
Nose and throat conditions:—				
Number defective	6	4	9	9
With single or combined defects, viz:—				
Tonsils	3	4	3	3
Adenoids	2	1	5	6
Deaf	2		5	1
Catarrh			2	3
Percentage of children with nose and throat defects	12%	10.2%	28.1%	31%

Another investigation of 174 dull children in four classes in the William McKinley Primary School (each class contained the lowest 25 per cent. of the children of its scholastic grade in the school, while twelve other classes contained the brighter children) showed that nasal obstruction existed in 40 cases. There were also 68 eye-strain cases and 80 miscellaneous cases receiving parents' notices.

An investigation[1] was made of a special class for very defective children organized in the Wharton School, Philadelphia, which showed that of the 22 members of the class 14 suffered from nasal obstruction. It may be noted that 5 of the latter were complicated by discharging ears. There were also 11 cases of defective vision, 7 cases of poor nutrition, numerous miscellaneous physical defects, and almost all the children lived with poor foreign and almost illiterate parents.

[1] "Mentally Defective Children in the Public Schools," The Psychological Clinic, vol. ii, No. 3.

Dr. Ayres, in his report on "The Effects of Physical Defects on School Progress" (see pages 224 and 390), found, after an investigation of 3304 New York school children, that adenoids and enlarged tonsils were more prevalent among the duller children. Reproducing his findings:—

	Dull.	Normal.	Bright.
Number of children examined	407	2588	309
Hypertrophied tonsils	26%	19%	12%
Adenoids	15%	10%	6%

Proof that adenoids *cause* poor scholarship is best furnished by observing cases before and after the removal of the adenoids. Since such removal cannot put new brains into a feeble-minded child, nor change the home surroundings, this proof is better if a series rather than a single case be studied.

In this connection is presented a study of the effects of removal of adenoids, published by the writer in *School Hygiene*, May, 1909. So far as I am aware it is the only such study yet made.

One hundred children whose adenoids *had been removed by actual surgical operation* after diagnosis by the writer and by other Philadelphia medical inspectors were investigated in March, 1909. Miss Anna L. Stanley, the head nurse, looked up the cases, and to her much of the credit for this investigation should be given. The facts ascertained were: 1, the age and grade at the time of operation; 2, the date of operation; 3, the mental improvement after operation, according to the opinion of the teacher, and, 4, the mental improvement after operation as shown by grade promotion.

The series was reduced to 70 because of inability to trace many of the children.

The average age for each grade is as follows:—

Grade 1	2	3	4
7.6 yrs.	9.7 yrs.	12.2 yrs.	12.7 yrs.

These "age-per-grade" figures may now be compared with the age-per-grade figures of the whole city of Philadelphia, taken from a report of the Superintendent of Schools, and also with similar figures for the foreign district of Philadelphia, from which these cases were drawn. The Mount Vernon School, with a

population of 1200 children of foreign parentage, is used for this latter comparison:—

AGE PER GRADE (MONTH OF MARCH).

Age (average for the city of Philadelphia):—

Grade	1	2	3	4	5
	7y.7m.	9y.	10y.3m.	11y.2m.	12y.1m.

Age (average for the foreign district):—

Grade	1	2	3	4	5
	7y.8m.	9y.1m.	10y.	10y.11m.	12y.3m.

Age (adenoid cases in the foreign district):—

Grade	1	2	3	4	5
	7.6 yrs.	9.7 yrs.	12.2 yrs.	12.7 yrs.	

The retardation of the nasal obstruction cases is evident.

Mental Improvement After Operation.—This was ascertained by two methods: first, by an inquiry among the teachers, and, second, by an investigation of the promotion records. The reader will note that, owing to the impossibility of tracing all the children, the series studied below is further reduced to 63 cases.

The opinions of the teachers were conscientiously given, and, since there were scarcely any instances in which more than one case existed in any one class room, the general opinion expressed is free of the charge of individual prejudice. According to the teachers the degree of improvement may be thus stated:—

Much improved after operation	19
Improved after operation	25
Mental condition unchanged	16
Deteriorated after operation	1
Much deteriorated after operation	2
Total number investigated	63

This constitutes an encouraging report. In many instances, however, the "improvement" noted by the teachers must have been slight, for the record of promotions subsequent to operations is distinctly less optimistic. It is here given:—

CASES HAVING TWO OPPORTUNITIES FOR PROMOTION SINCE OPERATION (OPERATIONS JANUARY TO JUNE, 1908).

Promoted twice	4
Promoted once and failed once	21
Failed twice	10

CASES HAVING ONE OPPORTUNITY FOR PROMOTION SINCE OPERATION (OPERATIONS SEPTEMBER TO DECEMBER, 1908).

Promoted	7
Failed	20
Total number investigated	63

Such a record totaling 32 promotions and 52 failures after removal of the nasal obstruction certainly explodes the theory that the removal of adenoids is the panacea for all juvenile delinquencies. That it causes great improvement in some cases as well as a noticeable average improvement is the consensus of the teachers' opinions. It is well to bear in mind, also, that the frequently existing association of defective mentality and nasal obstruction does not signify in every case that the one is directly caused by the other, since nasal obstruction is found most frequently where poverty, poor nutrition, and poor ventilation exist, conditions which suffice in themselves to lower the mental standard of the child.

The interested reader can readily investigate this subject for himself by a little inquiry among his friends who are parents or teachers. Two cases cited at the 1908 meeting of the Pennsylvania State Medical Society, by Drs. G. R. S. Corson and Rufus B. Scarlett, respectively, may be quoted:—

CASE 1.—"I was consulted by a young man of 18 years who had never known what it was to breathe through the nose. He had had pneumonia three times the previous winter. He had no education, his hearing being much impaired because he could not breathe through his nose; he had a cold all the time, and had constant headache. The teeth were gone, he had to have false teeth above and below and the jaw was very narrow. On examination, I could find no other pathological condition in his nose or throat than immense postnasal adenoids. Nothing other than the removal of these growths was done for him. After the operation, he said, on coming out of the anesthetic: 'I feel so clear in my head; I can breathe through my nose.' In less than ten days his hearing was normal. I wish that I could emblazon on every house the fact that such results can be obtained from so simple a thing as the removal of adenoids.

"The advantage of removing adenoids was brought forcibly to my mind by the case of a little girl, whom a doctor sent to me for defective hearing and pain in the ears. She was a puny-looking child, quite deaf, and decidedly a mouth-breather. Examination of the ears showed the membranes to be intact, but markedly injected and retracted, which made me think immediately of the throat. The tonsils were slightly enlarged, and an adenoid was detected in the postnasal space. On removing the adenoids, I found a much larger one than I had sus-

Fig. 121.—Adenoid face (*Gile*).

pected was present. In a few days the child began to improve. A peculiar incident in connection with the case is that the child was operated upon June 29th, and by the Fourth of July she had improved so much in hearing that the family had to put cotton in her ears to prevent her being annoyed by the noise of the fireworks, as the concussion caused her considerable discomfort. After tonic treatment, she began to take on color and gain in weight. A few weeks ago, she looked like a different child."

My friend, Dr. Seth A. Brumm, has kindly furnished me the records of 6 children operated upon for adenoids in the spring of 1910. They attended the Samuel B. Huey Combined School, Fifty-second and Pine Streets, Philadelphia.

"Imelda B., Cedar Avenue, 13 years, 6 B grade, left down once on account of tonsillitis and diphtheria. Tonsils and adenoids removed—much better since."

"Albert C., Warrington Avenue, 12 years, 6 A grade, left down once. Operated upon last summer; tonsils and adenoids removed. Teacher says he is much brighter than last year, but he is repeating the work."

Fig. 122.—Same case two years after operation.

"Curtis M., Ludlow Street, 12 years, 6 A grade, was away a good bit on account of tonsillitis. Tonsils and adenoids removed about two years ago. Promoted ever since then and feels better."

"Lester G., Cedar Avenue, 16 years, 6 months, 7 B grade, stutters and is also deaf, but has been better since operation for tonsils in 1907."

"Charles H., Larchwood Avenue, 16 years, 5 months, 7 B grade, operated upon in 1908 for tonsils; has not had tonsillitis since."


2
1.
3.
1
2
3

"Edna W., South Fifty-first Street, 8 years, 5 months, 2 B grade, operated upon for adenoids and tonsils this fall. Keeps her mouth shut since operation. Is a very bright girl."

Treatment.

Prevention being always better than cure, a knowledge of the preventable causes of adenoids, nasal obstruction (*q.v.*) is valuable. Good health should be obtained and maintained by plenty of sleep, good simple food and fresh air. Coffee and tea should not be used. Colds should be avoided by the wearing of light-weight wool underwear and stout shoes in the winter. Gouty, rheumatic children or those of gouty parents should have their diet supervised. The habit of thumb-sucking should be broken up by bandaging the thumbs, and, if necessary, by anointing them with some bitter tasting substance. Pacifying nipples should never be used.

Because of the ultimate shrinkage of adenoids at about the tenth year, their occasional recurrence, and the risk attending every surgical operation there exists a difference in judgment as to the advisability of removing adenoids and also as to the best method and time of their removal. Opinion is unanimous that marked nasal obstruction in children between 8 and 12 years should be treated by operation at once. In theory, this procedure is just as much indicated in any child over 4 years of age, since incurable deafness, high narrow palate, irregular teeth, round shoulders and pigeon-breast may all be contracted before the age of 8, not to mention diphtheria with fatal results. In practice, however, judging from my own extensive experience (about 500 cases) with the large hospital dispensaries in Philadelphia, it is the rule to advise against an operation before the ninth or tenth year.

The reasons for postponement given the parents of children who have been sent to the dispensaries are, first, that the child is "now too young for an operation," and, second, that "recurrence is too frequent after early removal, and an operation at this time only means another afterward." I cannot help but feel that in some of these cases this advice is given because of the overcrowded condition of the clinics and the consequent hurry of the surgeons. In private practice I have not experienced

much hesitancy on the part of surgeons to operate on children over 5 years of age whom I have sent to them. Poor general health always justifies postponement of operation until a month in the country has put the patient in better condition. Heart disease or other vital weakness may of course prohibit operation.

In very young children adenoids should be removed if they cause marked obstruction or give rise to serious effects; otherwise it is well to treat the nose systematically by sprays and other

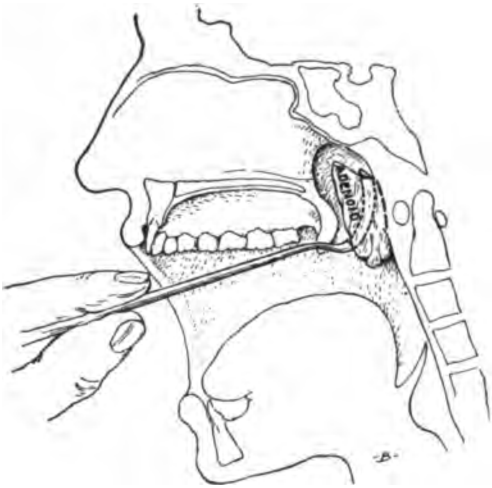


Fig. 124.—Schematic representation of the removal of adenoids by means of the curette (*Phillips*).

local applications and wait until the fifth or sixth year. Operation in babies is undoubtedly attended with extra risk because of the danger of pneumonia, and of injuring the very small nose and throat.

What should be the answer of the teacher and physician to the parent who asks, "Is this operation dangerous?" The teacher rightfully should see that the advice for operation is given not by herself, but by the medical inspector, or the family physician. This relieves her of all responsibility. The physician, when questioned, should not hesitate to protect himself by stating plainly that every operation is attended by some risk. He should proceed, however, to state that such accidents very seldom occur,

and, on the ground of probabilities, should not outweigh the arguments for operation. Personally, I have adopted the method of telling parents the truth as to the possible dangers, but of adding that I have never had a fatal result in over 100 cases that have been operated on by my recommendation. Calling into the principal's office 4 or 5 children who have been operated upon, to illustrate the survival of the patient, usually persuades the parent. My friend, Dr. John J. Cronin, of New York City, has interesting photographs showing clinics filled with children who have recently been operated upon. (See Fig. 48.) He regards the practical risk as very small, and has had a remarkably large official experience.

The operation consists in the scraping away of the adenoid tissue by a *curette* or by the finger-nail. The latter procedure is not as much used as formerly because of the fact that the finger can hardly be regarded as an aseptic instrument. Treatment without operation consists in the use of cleansing and soothing (and occasionally stimulating) applications.

RHINITIS. (Catarrh.)

Rhinitis is the inflammation of the mucous membrane lining the chambers of the nose, and nasal catarrh is its principal sign. Since the term catarrh is a general one and signifies a discharging condition of any inflamed mucous membrane, the conditions of gastritis with catarrh, enteritis with catarrh, cystitis (inflammation of the bladder) with catarrh, *et cetera,* are seen to be analogous conditions.

Rhinitis (and therefore its accompanying catarrh) may be *primary* or secondary. In children, as a rule, it is secondary and indicative of adenoid nasal obstruction. When primary it is usually due to uncleanliness of the nose, and is evidenced by the offensive discharge so frequently seen in unkempt small children. Sometimes primary rhinitis and catarrh result from relaxed condition of the tissues found in poor nutrition, nervous exhaustion, anemia and heart disease, or when the body is overheated, and for this reason delicate children, children confined too much indoors, and heavily dressed children suffer from this condition. Between the ages of 15 and 30 years acute rhinitis

is frequently found to be the result of sexual excitement, there being some sympathetic nervous relation between the lower spinal centers and the nasal vasomotor nerves.

Three principal varieties of rhinitis are recognized, namely: hypertrophic, atrophic, and purulent. Hypertrophic (the name signifies overgrowth) rhinitis is characterized by swelling of the mucous membrane, and ordinary mucous discharge. It is due to nasal obstruction from adenoids, foreign bodies, bony growths, deflected nasal septum, etc.; also to enlarged tonsils, poor nutrition, ill-ventilated hot atmosphere, weak heart, sexual excitement, and occasionally to excessive smoking. In adults it is also due to gouty and other poisons retained in the general system. The second variety, atrophic rhinitis, is characterized by wasting of the tissues. It occasionally follows old cases of hypertrophic rhinitis in which the circulation has become impaired from long-standing congestion. The mucous membrane shrinks, becomes hard, dry and glazed; crusts are formed, the discharge is extraordinarily offensive, and the sense of smell (and taste) is much impaired. The third variety, purulent rhinitis, has been already mentioned as the dirty nose of dirty children.

Treatment.—This, of course, consists in removing the cause plus the application of soothing and cleansing solutions. For this reason, good ventilation, good personal hygiene, tonics, an abstinent life, the removal of adenoids or other nasal obstruction, are measures to be considered as well as nasal sprays and douches. Atrophic rhinitis is most difficult to cure,—often impossible, but this disease is rare.

The following practical points should be remembered:—

1. A healthy child with a normal nose and throat, with plenty of fresh air, should be almost immune from colds in the head. Frequent colds in the head in young children are very suggestive of nasal obstruction.

2. Catarrh in young children is usually due to adenoids. Many cases where the adenoid growth is small and unsuspected are indefinitely classed as rhinitis or simply "catarrh."

3. A discharge from one nostril only, with obstruction of that nostril, is very suggestive of a lodged foreign body.

4. A very offensive nasal discharge, often thin, streaked with blood, and caused by a dirty-yellow-gray exudate in the nose very visible to anyone, is probably nasal diphtheria. These cases, strange to say, are not very sick because of the slight absorption into the system.

CERVICAL ADENITIS.

A poorly nourished child showing enlarged cervical glands was in former years termed *scrofulous*. The condition *scrofula* is too indefinite to have much value in modern medicine, but it in its day expressed the recognition by physicians of some relation between poor nutrition, anemia, adenoids, adenitis, phlyctenular conjunctivitis, infantile eczema and consumption. *Strumous* differs so little in meaning from the older one "scrofulous" that in this connection they may be taken as synonymous.

Causes.—Inflammation of the lymphatic glands of the neck has been already mentioned as a possible result of acute sore throat, acute tonsillitis, chronic enlarged tonsils, adenoids and decayed teeth. This is so because in all of these conditions the infected lymphatics drain into the same region of the neck.

Poverty, since it signifies weakened vital resistance from poor nutrition as well as a greater number of nose, throat and teeth defects, naturally favors the production of cervical adenitis. It also predisposes to its possible serious consequences.

Prevalence.—Because of the great frequency of adenoids and decayed teeth in childhood the secondary effect, cervical adenitis, is correspondingly frequent, about three-fourths of young school children possessing palpable small glands or "kernels."

Evidence.—Enlarged lymphatic glands in the neck are found under the jaw, or along a line extending down and forward from a point behind the ear, because these particular regions mark the course of the lymphatic vessels. They are to be distinguished from mumps because the inflamed parotid gland presents a large, uniformly curved, pear-shaped swelling, which is located above the lower level of the jaw, although partly behind that bone. Acutely inflamed lymphatic glands are swollen and tender. If abscess has occurred they become soft and the overlying skin becomes reddened. Tubercular glands

are frequently multiple—often 5 to 10. At first hard and almost immovable from fibrous adhesions, they eventually undergo softening ("cold abscess") and discharge.

Effects.—While almost all enlarged cervical glands whether acutely or chronically inflamed recover without treatment, they are, nevertheless, liable to experience violent infection with abscess formation and also mixed tuberculous infection. In this respect they are in no wise different from the other tissues of the body.

Fig. 125.—Cervical adenitis.

Abscess with *rupture* particularly follows scarlet fever and is one of the consequences always to be borne in mind. Less frequently it follows diphtheria and tonsillitis.

Tuberculosis affecting the cervical lymphatic glands may occur primarily, or be a secondary affection in a lymphatic gland already long inflamed. The tubercle bacillus usually (possibly always) gains entrance from the portals of infection just mentioned and (already described under anatomical considerations) in turn may infect the apex of the lung by extension downward.

Tuberculous adenitis is a really serious condition, since the patient is confronted with the risk of lung tuberculosis, of

abscess and an ofttimes chronic discharge, of infection through the mouth by careless handling of the tuberculous pus discharged from the abscess, and, finally, the risk of an operation, which is trifling if the abscess is merely opened, but quite serious if an attempt is made to really remove the diseased lymphatics and so at once cure the condition. It may be noted that the diseased lymphatics lie along the course of the carotid artery, jugular vein and pneumogastric nerve.

Treatment.—The treatment of ordinary cervical adenitis of a chronic character is the correction of the causative nose, throat or teeth defects, and good hygiene in poorly nourished children.

Acute suppurative adenitis (*i.e.*, with abscess) always ends in discharge of the abscess contents. In such cases a clean incision by the surgeon is far preferable to spontaneous rupture after poulticing, since the latter frequently leaves an ugly scar on the neck. Tuberculous cases constitute a really serious condition, since they usually break down and suppurate. In the early stages vigorous hygienic measures (good food, fresh air and rest), codliver oil, and local applications of iodine or iodide compounds may effect a cure. Glands which, though still hard, are so large that cure by medical measures is impossible are frequently removed by operation. The consensus of medical opinion is that operation and "complete" removal is advisable, although fairly dangerous and often proving to be *incomplete* in the light of subsequent events. After operation small infected glands not visible at the time frequently appear to discourage the patient and necessitate further treatment.

A softened tuberculous gland should be opened with the knife, and many surgeons advise abstinence from surgical measures until this procedure is indicated, believing that the natural softening and discharge is a better method than operation for ridding the system of all tuberculous material.

The cavity and narrow passage remaining after discharge of an abscess is known as a sinus. Such a sinus in the case of tuberculous infection frequently refuses to heal because of the inability of the tissues to rid themselves of all the tuberculous tissue. In such cases scraping and cauterizing of the sinus tract are necessary surgical measures.

The X-rays have been used with considerable success in the treatment of tuberculous cervical adenitis.

The treatment of cervical adenitis as above described should be interesting to the thinking teacher or parent, since the various measures advised are both rational and generally approved. The increase of vital resistance by better nutrition, the propriety of free opening and drainage of abscesses, the existence of *chronic discharge* because of *tuberculous material, foreign body, or dead bone,* should be known to every thinking person, since such knowledge is valuable in the treatment of many diseased conditions of the body.

THE EAR.

ANATOMICAL CONSIDERATIONS.

THE ear has three subdivisions, the external ear, middle ear and internal ear. The external ear consists of the auricle and external canal leading into the drum membrane. The middle ear consists of the tympanum (tympanic cavity), the drum membrane (tympanic membrane), three ear ossicles, Eustachian tube and air cells in the mastoid portion of the temporal bone. The internal ear consists of the cochlea and the three semicircular canals situated deep in the substance of the temporal bone.

The external ear receives the sound waves; the middle ear transmits their vibrations by means of the drum membrane and ear ossicles to the oval window on its inner wall; the internal ear contains lymph, which receives the transmitted vibrations and this lymph in turn agitates and stimulates the end filaments of the auditory nerve. In this manner air waves cause successively the vibrations of solid parts, the agitation of a liquid and the stimulation of a nerve. The canal of the external ear is about 1¼ inches long, the outer part being a cartilaginous tube and the inner part a bony canal. Since the direction of the bony canal is downward and forward, inspection of the whole canal and drum membrane is accomplished by pulling the auricle ("ear") upward and backward, which makes the direction of the cartilaginous tube the same. In young children the external canal runs forward but level, so that in their case the auricle should simply be drawn backward for the purpose of inspection.

The middle ear communicates with the throat by means of the Eustachian tube, which opens into it on the side wall of the pharynx ⅓ inch from its posterior end and at the level of the palate. The Eustachian tube opens slightly, coincidently with the act of swallowing, because the neighboring palatal muscles attach a few fibers to the tube orifice, and thus the middle ear is ventilated.

Ventilation of the middle ear in its turn keeps the atmospheric pressure within it the same as the general air pressure outside. Hence the advice given to visitors to deep mines to swallow occasionally while descending to lower levels. The drum membrane is the only solid structure interposed between the outside of the head and the throat, as is shown by the trickling into the throat of solutions injected into the ear, in cases of ruptured eardrum.

The proper ventilation of the middle ear and the maintenance there of the ordinary atmospheric pressure are natural safeguards against disease. Catarrh of the throat extending into the Eustachian tube clogs up the latter, causing, successively, insufficient ventilation, partial absorption of the air in the tube and middle ear, a partial vacuum, accumulation of mucus which has failed to drain down the tube, the growth of germs, and finally a secondary catarrh throughout the middle ear. This catarrhal inflammation not only causes defective hearing, but carries with it the liability to acute violent inflammation with abscess formation.

The opening of the Eustachian tube into the throat, its location in Rosenmüller's fossa, and the special anatomical conditions existing in infancy which favor disease of the ear if adenoids exist, have been already mentioned in the chapter on the Nose and Throat, Anatomical Considerations.

DISEASES OF THE EAR.

EXTERNAL EAR.

Diseases of the external ear include the presence of accumulated wax, the presence of some foreign body and furuncles (boils).

Accumulated wax usually occurs after a warm bath which has encouraged the excessive secretion of the ceruminous material. Some persons appear to be subject to the condition, the writer having 2 patients who regularly once or twice a year seek medical relief. Temporary deafness is a usual symptom, and in some cases a disagreeable and nerve-annoying buzzing in the ears occurs. The afflicted one is usually aware of the nature of the trouble, but exceptionally the condition may persist with

deafness for weeks without suspicion of the cause. A most remarkable tale was told the writer by the wife of a college professor who had suffered deafness for several months from accumulated hardened wax, had had the latter removed in the space of a few minutes by a physician after another had wrongly treated the case, and who suffered for days afterward from such distressing loudness of sounds that her ears had to be plugged with cotton.

Evidence.—Inspection of the external canal reveals the wax accretion, usually dark reddish brown in color.

Treatment.—The ear should be gently syringed with warm water until the wax is softened and loosened. This is preferable to the dropping of warm oil into the ear. Instruments should not be used except by a physician.

FOREIGN BODY in the external ear is rare in general practice and in school inspection. In six years' medical inspection of 35,000 children, I have never seen a case. Specialists, however, occasionally encounter them, and, since the ear canal swells almost shut from inflammation, their removal is often difficult. Dr. Foster, of Kansas City, Missouri,[1] reports an experience including a live worm, piece of slate pencil, bead, stone, grain of corn, live bug and piece of lead pencil.

FURUNCLES, or boils, of the external ear canal occur in the fissures of the cartilage lining the canal. They are usually caused by the scratching of the ear, with consequent infection and abscess. The subjects are usually in poor health. The pain is severe and the ear canal swollen shut or almost shut. At the beginning the best treatment is the application of dry heat, but if abscess occurs it should be opened by a physician, an operation which gives immediate relief. Furuncles are to be distinguished from the serious condition of middle-ear abscess, because the latter ruptures the drum without pronounced swelling or pain in the outside parts, or, if it involves the mastoid bone, the pain and swelling are *behind* the ear. The pain from a furuncle in the external ear canal is made worse by moving the jaw.

[1] New York Medical Journal, December 25, 1909.

DISEASES OF THE MIDDLE EAR.

Inflammation of the ear is known as otitis, and in the case of the middle ear as otitis media. The latter may be acute or chronic, and in either case may be simple (catarrhal) or suppurative (with discharge of pus). In their consideration the fundamental truth that over 95 per cent. of the diseases of the middle ear arise from infection from a neighboring diseased nose and throat *via* the Eustachian tube should always be borne in mind.

Acute Simple Inflammation

may be caused by adenoids and its nasal catarrh, by exposure to cold and wet, particularly by diving repeatedly into cold water, by acute throat diseases, such as diphtheria, scarlet fever and tonsillitis, or by infectious diseases accompanied by catarrh, such as measles and influenza. It constitutes the most frequent cause of earache. The treatment consists in the application of dry heat by means of a hot plate wrapped in a towel, or a hot-salt bag or a hot-water bag. Since there is always a possibility that the condition may go on to abscess of the middle ear, which entails a discharge of pus through the eardrum, it is a wise rule *to refer every case of earache lasting over twenty-four hours to a doctor at once.*

Acute Suppurative Inflammation.

This condition follows fast on the last when it occurs. Abscess of the middle-ear cavity (tympanum) and discharge of pus through the drum membrane occur in thousands of children without recognition of the event by children or parents, the pus usually soaking without notice into the plug of cotton which has been applied. In the majority of cases the jagged hole in the drum membrane heals readily and the patient entirely recovers. In a smaller number the whole drum is destroyed. In others the discharge continues for the reasons given below.

An abscess of the middle ear should be opened by a surgeon with a proper lance. Early operation may save the ear from serious damage, and a clean incision properly located is far preferable to a large, jagged hole in the membrane.

The pus from the ear of a child suffering from scarlet fever or diphtheria can transmit the disease.

Chronic Catarrhal Inflammation

is the result of the extension of a nasopharyngeal catarrh up the Eustachian tube. Hence it is caused by adenoids and enlarged tonsils. The Eustachian once congested and swollen, the ventilation of the middle ear is cut off and the partial absorption of its contained air produces a partial vacuum which in turn pulls in ("retracts") the eardrum. This latter, plus deafness, plus some discomfort in the ear, is a diagnostic sign to the examining physician. Middle-ear catarrh produces over 95 per cent. of all cases of defective hearing, if we except accidental temporary deafness from earwax in the outer ear.

Treatment.—This consists primarily in treating the adenoids and enlarged tonsils, thereby removing the nasal catarrh and allowing the catarrhal lower Eustachian tube to recover. The use of such special measures as insufflation of the ear and mechanical massage of the drum depend on the discretion of the physician.

Chronic Suppurative Inflammation.

If acute middle-ear inflammation with abscess occurs from scarlet fever or other cause, the latter may not rupture quickly and heal completely, but may before it bursts destroy a portion of the lining membrane of the tympanic cavity, or the underlying bone, or a part of one of the ear ossicles, or it may extend back into the mastoid bone behind the ear and destroy the spongy bone tissue found there. Sometimes tuberculous infection occurs. In all these cases the discharge of pus does not cease, but continues indefinitely from the ulcerated surface. Since the natural drainage from the ear is down the Eustachian tube into the throat, it follows that adenoids and enlarged tonsils which block this drainage may perpetuate the pus discharge.

Chronic discharging ears are usually very evident. Lack of cleanliness usually produces a sickening odor. Children betray their condition by the appearance of the discharge in the external ear, by plugs of cotton stuffed in the ears and by the

offensive odor. Defective hearing usually exists. This apparent minor trouble is an ever-present menace to the life of its possessor and the danger attendant upon it cannot be exaggerated. Constant absorption of small quantities of pus into the system lowers the general health and frequently causes loss of flesh and strength. As years go by, the tissues of such vital structures as the heart and kidneys feel the degenerative effects. The writer had often observed in a young man of his acquaintance his lack of color and a peculiar pasty whiteness of complexion, but had attributed it to excessive study and indoor sedentary occupation. But a short time since, in the course of conversation, the latter mentioned his deafness in one ear, together with a slight discharge of pus which had existed for years, but which had resisted early simple measures for its cure, and which he now endured, using a small plug of cotton in the ear and changing it daily. This was the reason for his poor physical condition, and similar cases unfortunately are numerous.

Even worse is the fate of the patient if the ear ossicles or the bone surrounding the middle-ear cavity become diseased and break down. The condition is then incurable except by operation for the removal of this diseased material, and any slight accident, such as temporary blocking of the discharge, may produce extension of the process to the brain and a subsequent fatal meningitis or brain abscess. How strangely indifferent intelligent persons may be in spite of warnings is seen from the fact that in 1904 the clerk of the dean of the medical department of the University of Pennsylvania lost his life from this cause.

Treatment.—The correction of nose and throat disease if it exists is as necessary as the direct treatment of the inflamed ear. The less serious cases of chronic suppuration may be cured by general tonic treatment and the persistent syringing of the ear under medical supervision. More severe cases require vigorous local treatment, and when the bone is diseased nothing but a radical operation will avail. Probably 60 per cent. can be cured by proper treatment without operation; 30 per cent. by prolonged vigorous treatment, and 10 per cent. absolutely require operation for the removal of dead bone or tuberculous tissue.

The number of good ear specialists is unfortunately not large.

DISEASE OF THE INTERNAL EAR.

This is so rare in its actual occurrence, and causes such an insignificant number of all cases of defective hearing, that it need not be considered here.

EARACHE.

Earache may be caused by acute simple inflammation of the middle ear, accumulated and hardened wax in the ear, furuncles in the canal of the external ear, acute abscess of the middle ear, decayed molar teeth or molar teeth of children during the cutting process, acute inflammation in an ear which is the seat of a chronic pus discharge, or by a bean or other lodged foreign body. These have already been discussed. Diagnosis of the condition causing the earache is made by the location of the pain and swelling, by inspection of the external ear canal and tympanic membrane, by the presence of scarlet fever, by the occurrence of headache, fever and vomiting (signifying meningitis from mastoid abscess), by the increase of the pain on movement of the jaw, and by examination of the teeth.

DEFECTIVE HEARING.

Defective hearing is a term preferable to *deafness,* since the latter signifies total loss of hearing. In this respect the two terms are analogous to *defective vision* and *blindness.*

Cause.—Defective hearing may arise from disease or defect of (1) the external ear, (2) the middle ear, (3) the internal ear, the auditory nerve or the brain.

1. *Defective hearing due to disease or defect of the external ear.* This is usually due to hardened earwax and therefore only temporary. It is quite frequent, however.

2. *Defective hearing due to disease or defect of the middle ear.* This may be due to middle-ear catarrh ("catarrhal deafness") or to chronic suppurative inflammation ("discharging ear"). Catarrhal deafness constitutes at least 95 per cent. of all deafness if temporary cases of deafness due to earwax be excluded from consideration.

The cause of catarrhal deafness is the extension of nose and throat catarrh to the middle ear *via* the Eustachian tube. The

nose and throat catarrh is usually dependent upon adenoids and enlarged tonsils. A glaring fault of physicians today is their failure to emphasize the fact that *ear disease and deafness depend on nose and throat defects.*

Catarrhal deafness varies in severity during the earlier stages, but later tends to become chronic.

Prevalence.—Judged by the standards of ordinary medical inspection the prevalence of defective hearing among school children is 3 to 4 per cent. Possibly one-fourth of these cases are temporary and due simply to earwax. Defective hearing not discoverable by the rough (and hastily conducted) watch test or voice test, but pronounced enough to be readily detected by a careful examination, occurs, however, in a considerable proportion of all children. Probably 15 per cent. of all school children show such slightly defective hearing in one ear only, and another 7 per cent. in both ears. The prevalence of chronic discharging ears is about 2 per cent. in the lower grades. In the upper grades it appears to be very infrequent, but the fact that older children improve the ear condition by treatment and also conceal its existence by better personal cleanliness probably accounts for the more numerous cases evident in earlier years. It should be remembered that over one-third of all cases require vigorous persistent treatment or else operation for their complete cure, and certainly such a procedure is seldom carried out.

For exact figures, see the chapter on Prevalence of Defects.

Evidence.—The observant teacher will often suspect deafness if the child is a mouth-breather, is slow in executing commands, and is apparently stupid. The latter is often conscious of no symptoms whatever. There may be deafness, fullness and discomfort in the ear, and a crackling sound in the head when swallowing, due to the slow separation of the sticky walls of the Eustachian tube during that act. The child, if he has reached the age of 10, realizes that he is deaf, particularly if but one ear is affected. It is important to note that timid children will frequently conceal their infirmity. Older children if questioned will sometimes confess to a feeling of fullness and discomfort in the region of the ear, and even to headache in a few cases. Otherwise there is a surprising ignorance in children (and parents too) of their condition, and no one has ever

recorded that a small child of his own initiative complained of inability to hear. For this reason cases of defective hearing must be revealed by a systematic examination.

Methods of Testing Hearing.

A quiet and friendly manner is essential when dealing with school children. A deliberate and dignified demeanor is wise also, since school children unconsciously assume the same attitude toward the procedure as does the examiner himself, and are liable to be careless and untruthful in their answers if they have lost their respect for him and his work. The test should be conducted in a room of at least fair size, free from the noises of the school and the street. No other children should be in the room, as they distract the attention of the one examined. Their premature observation of what they are to do and say during the test makes it of little value when subsequently applied to them.

The ears are tested separately.

The Watch Test.—The examiner should use a watch which has already been experimentally used and its standard distance for normal hearing ascertained. This distance may be, for instance, 24 inches. The examiner should stand behind the child, whose eyes should be closed. The watch should then be placed close to the ear, so that the child can appreciate what he is expected to hear, and finally the test made by placing the watch at extreme range and bringing it slowly closer until it is heard. The record may be simply made as "normal," "slightly deaf," "deaf," "watch 4 inches." If an accurate estimate is desired, the greatest distance in inches at which the watch can be heard is recorded; or the standard distance for the watch may be taken and a fraction formulated which when squared gives the degree of hearing, since the intensity of sound varies with the square of the distance. Thus, a person who can hear a 24-inch standard watch at 8 inches has one-ninth rather than one-third hearing. A quantitative record, however, is best made with the audiometer.

The Whispered Voice Test.—This is less accurate, but more practical, than the watch test, since an intelligent answer to a

verbal question constitutes a proof that the latter has been heard, but on the other hand children when tested with the watch answer affirmatively as a rule whether they hear or do not hear, so that multiple tests and tricks are necessary to establish their actual acuity of hearing. In an absolutely quiet room a whispered voice should be heard 25 feet. Experience in medical inspection soon teaches, however, that such absolutely quiet rooms are seldom found.

An examiner standing behind a child while testing his vision can quite fairly estimate his hearing by whispering a question as to the child's age, or address, first standing to one side and then on the other. This procedure really serves admirably in routine medical inspection. Children who fail to hear the questions should be further examined.

If there be no medical inspector and the teacher examines the class to satisfy herself that no gross cases of defective hearing exist, a method of wholesale examinations reasonably accurate has been suggested by E. A. Kirkpatrick, of the Fitchburg, Massachusetts, State Normal School[1]:—

"At the Fitchburg State Normal School a group test has been adopted that is more quickly made and more accurate than individual tests. As many as 15 children may be tested at once in an ordinary school room. They are placed 5 each in the two outside rows and the middle row of seats. They are supplied with paper and pencil, and asked to keep their eyes to the front while the teacher, standing on the right, opposite the middle pupil, pronounces in a low, distinct tone, and in a low, distinct whisper, a series of numbers which they are required to write as a dictation exercise. After four or five numbers have been given in a low tone, and as many in a whisper, the children change seats, those nearest going to the farther side of the room and the middle row taking their places, those in the farthest row coming to the middle row. After dictating another series of numbers, the moving is repeated, and another list of numbers is given. This completes the test of the right ear, all pupils having been tested at three distances—near, far and medium. The left ears are tested in a similar way. The teacher then

[1] Psychological Clinic, June, 1909.

collects the papers, and marks them one for every digit written correctly. The marks of the children for the right ear and the left ear respectively are then averaged. The record of each ear for each child is then recorded in the form of a fraction, the denominator of which is the average for the group (or for the whole room tested by the same teacher), the numerator of which is the number of digits correctly written by the pupil for that ear."

This record shows accurately the acuteness of the hearing of each child *as compared with that of his mates,* regardless of the size of the room, its quietness, and the loudness and distinctness of the voices of the teachers who have made the test in different schools. All but the first grade may be tested in this way, but it is well in the lower grades to give a little preliminary practice in writing numbers in columns, as they are spoken in an ordinary tone of voice, so that the children will not have to give thought to getting them arranged properly. To avoid confusion, let the pupil write the numbers spoken to the right ear on the side of the paper on which he writes his name, and those spoken to the left ear on the other side. It is well, after giving a number, to say in an ordinary voice, "Write." The children who do not hear can make a dash in place of the number.

If 5 different numerals are given for each series in a low tone, and the same number in a low whisper, the total number of digits given in testing one ear will be 30. The test will have been satisfactorily made if the number heard averages about 20. This will mean that the teacher has spoken in a sufficiently low tone to make it impossible for those in the farthest row to hear. It is well for the teacher to give herself a little practice in speaking in a low but distinct tone and whisper, before making the test.

The audiometer is a useful instrument for accurately testing hearing. Since McCallie's invention,[1] by which a standard and uniform test sound is produced by the action of gravity rather than by electricity generated in unstable batteries, it will doubtless come into considerable favor. At the present time in our large cities the inadequate systems of medical inspection

[1] Mr. J. B. McCallie, the Centennial School, Trenton, N. J.

preclude its adoption, but for thorough medical inspection, for physiological or psychological laboratories and for medical specialists it is a most desirable instrument.

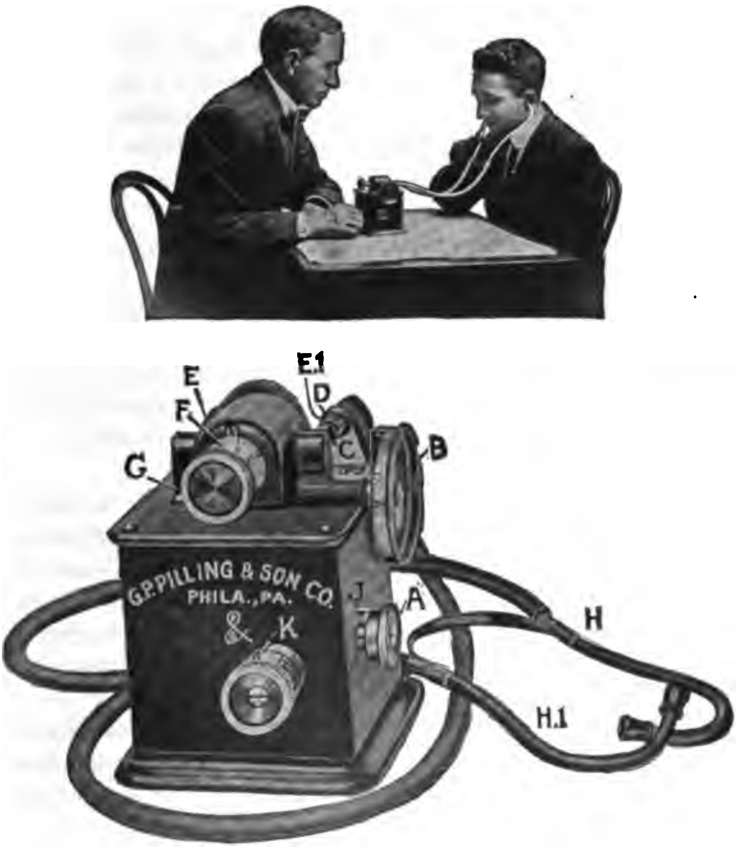


Fig. 126.—McCallie's audiometer.

Effects of Defective Hearing.

The effects of defective hearing have been mentioned already in connection with adenoid nasal obstruction. Briefly they are stoop shoulders and flat chest, lowered scholarship when the deafness is of moderate degree, and marked mental deficiency, possibly deaf-mutism, when the deafness is absolute.

Stoop Shoulders.—Slight or moderate defective hearing causes stoop shoulders and flat chest from the continual leaning forward to hear. The contracted chest in turn produces increased liability to tuberculosis.

Blank Facial Expression.—The calm, even vacant expression on the faces of deaf children is caused by the lack of awakening auditory impulses. Cut off from much that is going on around them, their isolation and quiet, vegetating existence shows itself plainly. The movements of such people are slower, as a rule, than those possessing normal hearing.

Defective Speech.—The voice and speech of the sufferer from defective hearing is frequently peculiar, because of the inability to hear sounds and words when they are spoken. In the case of marked deafness, actual deaf-mutism results. Until comparatively recent years many such children were allowed to grow up feeble-minded by deprivation, and the replacement of the old finger-language by actual speech, due to phonetic teaching of the deaf, has been a wonderful advance accomplished only in the last few years.

Peculiar Temperament.—Deaf children are slow in thought and actions, because of their isolation and lack of mental development. Adults who have become gradually deaf sometimes become peculiar in temperament. Possibly this is due in part to the introspection which isolation creates, and in part to suspicions engendered by friends' and neighbors' actions which are seen, but imperfectly comprehended.

Liability to Acute Inflammations and to Infectious Diseases.—The reader is reminded that most persons with defective hearing suffer from middle-ear catarrh (*q.v.*). This danger sign should never be disregarded.

Lowered Scholarship.—With the possible exception of poor nutrition, defective hearing (in moderate degree) is the most powerful retarding influence encountered by school children.

Since the deaf children are the adenoid children and *vice versâ,* what has been said concerning the effects of adenoids on the scholarship of children applies here also. The reader should turn to that section and review the statistics and illustrations given. In addition to these may be quoted a report taken from the Report of the London County Council, 1907, page 23, in

which the scholarship of normal children and children with defective hearing is compared. Most of these children were doubtless sufferers from adenoids, but defective hearing by test was made the basis of comparison:—

One thousand poor children in the East End schools of London were tested for acuity of hearing, and the record in each case compared with the statement of the child's mental status furnished independently by the teacher. The resulting summary and analysis showed that the "deaf" children were the poorer scholars.

	Children with sufficient hearing.	Children with insufficient hearing.	Calculated percentage deaf children.
Worst mentality	23	12	*52*
Poor mentality	70	26	*37*
Fair mentality	200	100	*50*
Good mentality	226	106	*47*
Excellent mentality	185	53	*29*

Treatment.

The importance of early treatment in cases of defective hearing cannot be overestimated, because of the obstinate nature of old cases, the retardation of the deaf child's mentality, and the liability to flat chest and stoop shoulders from the habitual leaning forward to hear. The treatment has already been outlined in the paragraph on the treatment of middle-ear catarrh, namely, correction of nose and throat defects, cleansing and ventilation of the Eustachian tube and middle ear, and mechanical vibratory massage of the stiffened eardrum.

Summary of Most Important Statements.—1. Ear affections are usually caused by disease of the nose and throat.

2. Catarrhal deafness is the most frequent of ear affections. It is almost always secondary to nose and throat disease.

3. Children who are deaf may be suffering from adenoids, even though the latter be invisible.

4. A child suffering from an earache of twenty-four hours' duration should always be referred to a physician for treatment.

5. Chronic suppurative ear discharge is a constant menace to the life of the person so affected.

6. Ear disease and deafness should be treated early. The difficulty of cure and the necessity of direct treatment of the ear increases with the duration of the disease.

7. Defective hearing is the physical defect constituting the greatest bar to progress in school.

THE TEETH.

ANATOMICAL AND GENERAL CONSIDERATIONS.

A TOOTH is a modified bone, and may be likened to a long bone so situated that one end projects into the mouth. This free projection, which is called the crown of the tooth, is covered over by a hard *enamel,* which under the microscope is seen to be a sort of modified epithelium. The tooth proper is composed of a bony substance termed dentine and a quantity of nerves and blood-vessels. The blood-vessels supply the buried surface of the tooth from the adjacent gums, and also pass directly into the large central "pulp cavity" of the tooth through the large root canal.

Traversing the hard dentine substance are numerous minute canals, which, by terminating both in the central cavity and on the outer surface of the tooth, possibly insure nutrition of the dentine from two sources. The nerve of the tooth passes into it through the root canal and ends in the *pulp,* which is composed of blood-vessels, nerves and a little delicate connective tissue.

The function of the enamel is to give hardness to the tooth surface and to protect the underlying dentine (which like bone is largely lime salts) from decay through chemical or germ action.

A dental arch may be defined as a row of teeth and their surrounding gums and bony sockets. Each jaw therefore possesses a dental arch, which in the normal adult possesses 16 teeth.

The hard palate, which forms the roof of the mouth and floor of the nose, fills in the space included by the upper arch. The septum (partition) of the nose stands upright upon the palate, and separates the right and left nasal chambers from each other.

A healthy infant or child breathes through its nose and sleeps with its mouth closed, the tongue pressing against the sides of the roof of the mouth and thereby slowly widening the palate.

The apposition of the teeth of the upper and lower arches during the act of biting is technically termed *occlusion.* If the teeth in the arches are in perfect occlusion with their corresponding opposite teeth, each upper tooth "bites" one-half space back of its corresponding tooth in the lower jaw.

Speaking generally, a tooth is composed of an exposed portion, or crown, and a buried portion, or root. The temporary teeth normally are dropped from the mouth by reason of the absorption and disappearance of their roots. The pressure of

Fig. 127.—Showing articulation of the teeth when in correct occlusion. (For the illustrations in this chapter, except those of school children, the writer is indebted to Dr. E. A. Bogue, New York City.)

the growing permanent tooth underneath the temporary tooth causes this absorption. The crowns of the temporary teeth should not decay, although unfortunately they are often allowed to do so from neglect.

It is interesting that *crowns* of the permanent teeth are full-sized all through infancy. They lie packed in around the roots of the temporary teeth, as shown in the accompanying illustration. When their roots begin to grow they are pushed against the temporary teeth, with consequent absorption and loosening of the latter.

The temporary teeth number 20; the permanent teeth 32. Their names and the time of their appearance in the mouth are given here:—

Years.		Years.	
6.	Four first molars.	10.	Four second bicuspids.
7.	Four middle incisors.	11.	Four canines.
8.	Four lateral incisors.	12.	Four second molars.
9.	Four first bicuspids.	17-25.	Four third molars.

The most important tooth is the first permanent molar, which appears at the age of 6 years. This tooth by reason of

Fig. 128.—Skull of a small child, showing temporary teeth and full-sized crowns of the buried permanent teeth.

its size, position and early appearance guides the other permanent teeth into proper position. If it is lost in early youth irregular positions of the remaining teeth frequently result.

DECAY OF THE TEETH.

Dental decay or caries, notwithstanding its frequency, is an unnatural event and one caused largely by the improper habits existing in civilized life. The temporary teeth normally are lost by the pressure on their roots of the growing permanent teeth beneath them,—a pressure which causes the absorption of the buried portion of the tooth and its loosening from the gum. The permanent teeth should last throughout life.

The causes of decay are both constitutional and local. The principal constitutional cause is the lack of that vital resistance which gives the tissues of the body the power of resistance to bacteria. Such a vital resistance is evidently necessary in a region such as the mouth, which constantly swarms with all kinds of bacteria, and the teeth of poorly nourished children particularly show decay for this reason. In addition to low vital resistance from poor nutrition, there may be a lowered vital resistance in the mouth from acidity of the secretions, such as is found in gout and in certain nervous disorders.

The local causes of decay are the action of certain bacteria which produce lactic acid, and conditions which favor the lodgment of organic matter and the activity of these bacteria. These conditions comprise irregular teeth, the eating of soft food and the lack of cleanliness. The decay of the teeth through the action of the lactic-acid-forming bacillus is easily understood when it is remembered that the bony substance of the tooth (dentine) is composed of lime salts. Only the presence of the covering tooth enamel protects the dentine, and, a crack in the enamel once existing, decay rapidly progresses.

Regularity of the teeth is a powerful safeguard against decay, because such teeth are practically self-cleansing.

A soft diet is usually a vegetable one and composed largely of starchy substances. Such food does not provide the automatic cleansing given by the vigorous chewing of coarse, tough material. For this reason the teeth of herbivorous animals decay, and those of carnivorous animals are well preserved.

Illustrative of the neglect of the teeth in the children of the poor is the report of an inquiry in Edinburgh and Aberdeen showing that about 8 per cent. of the school children used the

toothbrush daily and 25 per cent. did not use a toothbrush at all.

The same neglect that causes dental decay may produce soft, spongy, bleeding gums, deposits of lime salts mixed with thickened mucus ("tartar") at the necks of the teeth, or the presence of repulsive greenish, fungous growths so often seen among the children of the ignorant poor.

Fig. 129.—Almost every tooth decayed.

Prevalence.—It has been well said that if all the children in the United States had their teeth systematically cared for, there would not be enough dentists to do the work. Official reports of health boards giving the results of medical inspection show formidable figures which are nevertheless inadequate because of the inspections being hurriedly made by medical inspectors without special dental knowledge. Taking the whole number of school children in the first 8 grades, probably 40 per cent. show one or more decayed teeth evident to anyone. Particularly between the ages of 6 and 9 years, while the temporary teeth are being improperly lost by decay, rather than by root absorption and loosening, is the condition prevalent. Thus the writer, at

the School of Observation at the University of Pennsylvania, found 50 to 55 per cent. of the young children with from 1 to 8 decayed teeth each. The London School Report states that 680 out of 700 young children of poor social station (97 per cent.) possessed decayed teeth. Of these, 323 children possessed 6 or more. Dr. Haven Emerson, carefully examining the teeth of 1478 poor children admitted to the Sea Breeze, Long Island, Sanitarium, found 1200 (81 per cent.) with dental decay and exhibiting 5996 decayed teeth, an average of 4.7 each.

Fig. 130.—Numerous decayed teeth.

Evidence.—Decayed teeth may be known by the toothache (see Toothache, p. 313) accompanying the death of the nerve or abscess of the tooth pulp and gum, or by inspection of the teeth. It should be remembered that a decayed tooth after the death of its nerve and pulp gives no particular discomfort to its owner unless retained putrefied matter in the interior of the tooth sets up an abscess.

In many young children the teeth are so decayed that a single glance shows half a dozen or more broken-down stumps (Figs. 129 and 130).

The misleading symptom of earache caused by a decayed tooth has been already mentioned in the chapter on the Ear. Facial neuralgia may likewise result.

The effects of dental decay are (1) lowering of the general health, (2) increased liability to infectious diseases, (3) improper occlusion of the teeth with resulting deformities and irregularities of the teeth.

Lowering of the general health is caused by the imperfect mastication of food, with resulting malnutrition and indigestion, and by the swallowing of germ-laden food with putrid material from unfilled cavities, causing indigestion and poisoning of the system. Incidentally, the causation of indigestion by defective mouth conditions is only too frequently overlooked by physicians.

In childhood the decayed material swallowed is rendered aseptic by the hydrochloric acid of the stomach. Nature thus safeguards against an only too common unhygienic factor. Certainly with 40 per cent. of all school children and 70 per cent. of younger school children possessing decayed teeth the depressive influence can be operative in only a limited number of cases or our whole juvenile population would be invalids.

In adult life, however, when dyspepsia is frequent and the protective power of the secretion diminished, there may occur the gravest diseases and most marked debility from decayed teeth. Dyspepsia, poor nutrition, anemia, and tuberculosis, and possibly pernicious anemia and malignant growths of the stomach, are examples of these. Let us, therefore, make our theme *present preservation for future protection.* The child should be taught that adenoids cause irregular teeth, and that such teeth decay readily. He should be taught that decayed teeth, chronic gum abscesses, and lost teeth will, after a time, produce certain definite conditions which will lower his adult value.

The infectious diseases favored by decayed teeth include tonsillitis, diphtheria, pneumonia and tuberculosis. In the case of tuberculosis the infection travels down the root of a decayed tooth[1] to the lymphatic glands of the neck, and thence to the system generally or directly to the nearby apex of the lung. Examinations of the secretions from unclean mouths show enormous numbers of bacteria, compared with the secretions

[1] British Medical Journal, August 20, 1904. See also an interesting article in the Journal of the American Medical Association, June 30, 1906.

taken from clean mouths. In these bacteria are found occasionally the germs of the diseases mentioned above.

Deformities of the mouth through loss of the teeth are particularly marked if the teeth be lost early in life, before the jaws have had their full development. The spaces left by the lost teeth are more or less encroached upon by the adjacent teeth, with resulting small, undeveloped jaw from lack of interdental pressure. In this way a receding lower jaw, or a receding upper jaw (the latter termed lantern-jaw or prognathous jaw), is produced. In the latter variety the lower jaw is apparently protruded.

That dental decay lowers the scholarship of school children has been claimed by numerous writers, particularly by Mr. Leonard P. Ayres, of the Russell Sage Foundation. Notwithstanding the figures showing the association of defective teeth with poor scholarship, carefully estimated, the evidence of the depressing influence of decayed teeth upon both the general health and the scholarship of the *whole number of children* is inconclusive.

In his analysis of the physical condition of New York school children given in the chapter on Prevalence of Physical Defects, the dull boys (10 to 14 years) showed decayed teeth to exist in 42 per cent. of their number, the average ("normal") children 40 per cent., and the bright children 34 per cent. The difference here shown may mean any one of three things: it may mean that the dull children were so because of decayed teeth, although this would seem strange when it is also noted that 34 per cent. of the brightest children also showed decayed teeth; it may mean that the dull children came from poor homes where decayed teeth existed along with poor food, poor ventilation, neglect, illiterate parents, and other evils; it may mean that there were more young (10-year-old) children among the bright children and more old (14-year) children in the group of dull children. This would seem reasonable. The reader is reminded that a child of 10 has better teeth than at any other age, because the last temporary tooth has just been lost and the permanent teeth are all as yet fairly new.

The only proof of the depressing influence of a physical defect is improvement after the removal of that defect,

and the only instance of which I am aware in which the teeth of the children of a large school (The Burk School, Philadelphia) were carefully attended to has resulted in no noticeable improvement in the scholarship of the children according to the statement of the principal.

From the above consideration it would appear that most of the estimates on the economic cost, educational cost, and health cost of the decayed teeth of children have been made on uncertain premises. On the other hand, there is more damage done in adult life through the agency of dental decay than we realize at the present time.

Treatment.—Decayed teeth should be filled if possible and failing this should be extracted. The general principles of surgery, that dead material must be removed before healing can be accomplished, and that an exposed nerve cannot live, are true in dentistry as well as elsewhere. The temporary teeth of children are frequently neglected even by dentists, many of whom maintain that a temporary tooth far gone in decay had better be left in the mouth than extracted, in order to insure the proper positions of the incoming permanent teeth. In these cases temporary fillings of copper cement are particularly useful.

The care of the teeth is discussed in a subsequent paragraph.

TOOTHACHE.

Toothache is not a disease, but a symptom. Like headache and earache, however, it is important enough to warrant consideration.

Toothache results either from an exposed nerve or from putrefaction of the tooth-root contents. In the former case the pain is excited by cold, by chemicals (air, sugar, etc.) and by mechanical stimulation (the touch of the tongue or food particles) and is relieved by such anodynes as oil of cloves, carbolic acid and gentle heat. Sometimes the nerve is not absolutely exposed to the air, but almost so, while, in others still, a filling may be too close to the nerve.

Toothache may result from death and putrefaction of the tooth contents. This condition is essentially an ordinary abscess and presents the pain and tenderness of any abscess. Because

of the confinement, at first at least, of the abscess contents, throbbing of the painful tooth is frequently noted. The pushing of the increasing abscess contents out of the root of the tooth first gives a "big" feeling to the tender tooth and then causes the familiar gum boil (alveolar abscess).

Fairly correct diagnosis of the cause of toothache may be made by inspecting the tooth for evidence of decay, for an old filling, and for swelling of the gum, by asking the child whether cold water or sugar or the touch of his tongue produces pain, and by tapping on the teeth of the region with any small instru-

Fig. 131.—Abscess from root of decayed tooth about to discharge on face and an old case already existing for two months.

ment, in order to detect tenderness in some tooth. In the case of a dead tooth with pulp abscess the child should be told that drugs are of no avail and opening up of the tooth or its extraction absolutely necessary.

ALVEOLAR ABSCESS.

If abscess results from death of the pulp of a tooth, the pus extends out through the root of the tooth to the gum tissues surrounding it. The abscess usually points into the mouth, causing more or less swelling of the cheek before it ruptures. Occasionally a gum boil in the lower jaw points deep into the cheek and ultimately breaks upon the face, causing an ugly and troublesome sore. Two boys suffering from such abscesses are shown in the accompanying illustration. In one of these

cases the abscess had risen not from the interior of a whole tooth, but from an old fragment of tooth which had remained buried in the gum. The case had been treated for over a month in the surgical dispensary of Philadelphia's leading hospital without appreciation of the cause.

Since practically every alveolar abscess signifies decay in or around a tooth, every case encountered in school should be sent

Fig. 132.—Casts of upper and of lower jaw. The upper shows high, narrow palate, V-shaped dental arch, and irregular teeth.

by the teacher or inspector to a dentist. Rupture of the gum boil or opening of the tooth by a dentist causes immediate relief of the pain, by discharge of the pent-up pus and gas. An incipient gum boil can often be cured by prompt operation on the tooth.

HIGH, NARROW PALATE.

This condition, not long ago classed as a stigma of degeneracy because of its frequent occurrence in the feeble-minded and

criminal, is now known to be due to simple mechanical forces operating during mouth-breathing.

It happens that mouth-breathing is common in the poor, the criminal and the feeble-minded because of the frequent occurrence of poor nutrition, adenoids and catarrh, and among the feeble-minded it is still more frequent because of poor tone of the mouth muscles. Not so many but just as pronounced cases

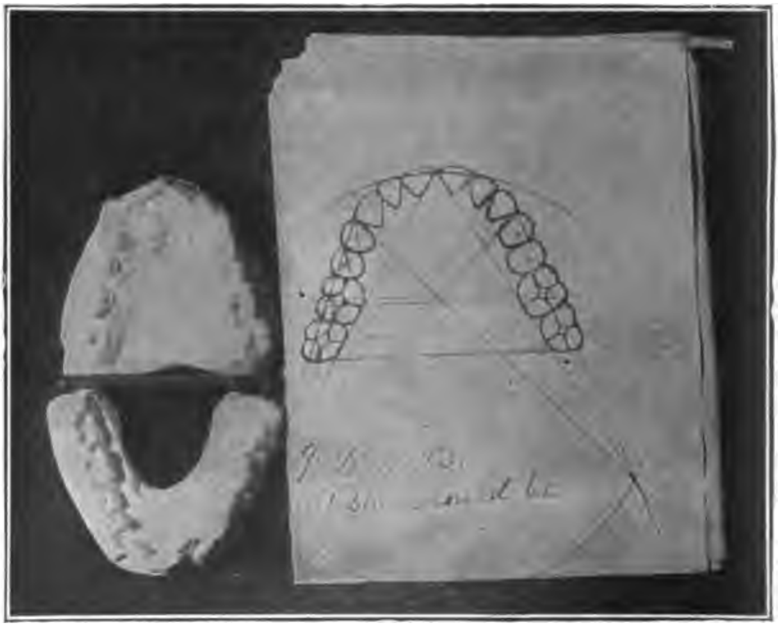


Fig. 133.—The upper plaster cast shows a narrow palate and narrow dental arch. Beside it is a chart showing the proper width of this arch and the teeth in the position they should occupy.

of high-arched palate are found in individuals of perfectly normal mentality and heredity. The development of high-arched palate (by lack of lateral tongue pressure, etc.) has already been explained in the paragraphs detailing the effects of adenoid nasal obstruction, and to them the reader is referred.

A relatively small number of cases of high-arched palate are caused by early loss of permanent teeth. In these cases the

dental arch is not forced to expand and develop as it does normally, since the remaining teeth do not press against each other along the whole row. Both the facial appearance and speech are apt to suffer.

The treatment of high, narrow arch is the removal of all nasal obstruction by a surgeon, and the subsequent pushing out of the dental arch by a mechanical apparatus. The latter process is termed "arch expansion" or "regulation" by dental surgeons. The process requires time and is difficult after the

Fig. 134.—Irregular teeth.

twelfth year. Usually the two middle incisor teeth spread apart a little owing to the fact that the greatest separation is along the bony suture in the midline of the palate. (See Orthodontia.)

Whether or not the high palate and its accompanying deflected nasal septum are corrected by widening the dental arch is uncertain. The palate is certainly lowered after regulation and expansion in the case of very young children, but in older ones a direct operation on the nose is usually necessary to open both sides of the nose satisfactorily.

IRREGULAR TEETH.

These are caused most frequently by a narrow dental arch, which in turn, as we have seen, is usually caused by adenoids.

It is plain that the V-shaped dental arch does not possess the accommodation for sixteen teeth that the normal U-shaped arch does.

When irregularity occurs the canine tooth is the one most frequently crowded out of position.

Other causes of irregular teeth are the early loss of teeth, the late appearance of the canine teeth, retention of temporary teeth, supernumerary (extra) teeth, and improper childish habits such as lip-sucking and thumb-sucking.

MALFORMED TEETH.

Small incisor teeth, rounded and tapering like pegs, with shallow concave, or notched biting edges, are suggestive of rickets or of inherited syphilis. Since rickets is very common and inherited syphilis is rare, and also because the diagnosis of inherited syphilis is a serious charge against the parents, the diagnosis should always be in favor of rickets unless other signs of inherited syphilis are found. The careless verdict by a medical inspector of inherited syphilis, with no other evidence than a few suggestive signs, is most reprehensible. The physician will forget the case in five minutes, but the incorrect diagnosis will remain with the horrified teacher and possibly be passed along from one teacher to another to the injury of an innocent and often healthy child.

Transverse grooves and pittings across the face of the teeth are indicative of severe constitutional disturbance at an earlier age by rickets or scarlet fever or other temporary illness.

IMPACTED TEETH.

Crowding, or impaction, of the teeth results not only in irregularity, but occasionally in nervous disorders from reflex irritation. The latter condition is analogous to the nervous irritation from eye-strain or dyspepsia. A sufficiently large number of cases of nervous children who improved after the extraction of impacted teeth has been reported to prove the relationship of the two conditions, but it must be admitted that the enthusiasm of the writers and the inconclusive evidence offered in most of these cases have exaggerated it. Thus an

unruly small boy who has had the combined services of a sympathetic young lady social visitor, a psychological clinic, the dean of a prominent dental college, and a dental surgeon, confides to the young lady immediately after the extraction of the offending teeth that he feels like a better boy. This appears to be a case of suggestion or possibly a case of reform by the action of a kindly and uplifting environment.

It should be remembered that a certain amount of lateral pressure is probably normal in every growing child's mouth and tends to develop the dental arches and the face generally. It should also be remembered that, although nervousness may result from impacted teeth, it may result from numerous other causes, so that even the association of the two conditions is inconclusive. The best information I have been able to obtain upon the subject is the report of Dr. Louise Patterson, of the New Jersey Training School for Feeble-minded Children, who states that 7 troublesome children in the institution who possessed impacted teeth (verified by a skiagraph) had these extracted with resulting marked improvement of disposition in 1 boy, but no noticeable change in the other 6.

The eruption of the permanent molar teeth, at 6 years, 12 years and (about) 18 years, respectively, is often attended with general nervous disturbances and occasionally with earache as well. This is particularly true of the wisdom teeth, and least so in the case of the 12-year molar, which usually causes no disturbance.

CARE OF THE TEETH.

The injurious effects of decayed teeth upon the general health are well known, but unfortunately much disregarded in young children. *This neglect, for it is nothing else, is due to the general feeling that disease of the first teeth entails nothing more than the loss of temporary members which will soon be made good,* and also to the inability of children themselves to appreciate the presence of decay until toothache announces partial or complete destruction. As we have seen, the decay of any tooth is a disease. The temporary teeth should be dropped from the mouth with roots absorbed, but crowns intact, and the permanent teeth should last throughout life.

Proper care of the teeth includes cleanliness and alkalinity of the mouth. For this reason a vigorous scrubbing with chalk or magnesia tooth powders answers every purpose.

Ten pounds of tooth powder is worth two hundred pounds of dentist.

Spongy, bleeding gums are improved by this vigorous treatment and also by rubbing with the fingers. They are caused, however, principally by rickets, scurvy, and other forms of anemia, and therefore require improvement in the general health for their cure.

The proper method of brushing the teeth is *up and down* rather than across them, as by this procedure the spaces are thoroughly searched. During this operation, the handle of the toothbrush should be held horizontal while brushing the outer surfaces, and vertical while brushing the inner surfaces.

The teeth should be brushed at least morning and night. Of these the night cleansing is the more important. Toothbrushes whose end-bristles are formed into a tuft extending beyond the line of the rest of the brush are the more serviceable and efficient for cleansing. An occasional routine visit to the dentist should be made and the teeth thoroughly rubbed and polished with pumice powder.

CORRECTIVE MEASURES.

The Treatment of Dental Decay.

The two basic principles in the treatment of carious teeth are the removal of all decayed material and the protection of the nerve and other live tissue in the pulp cavity from exposure. By the term exposure in this connection is meant exposure to metallic filling substances as well as exposure to the air.

Therefore the fate of a decayed tooth rests upon its condition after all the decayed portion has been taken away. A filling with some metallic substance such as amalgam, gold or porcelain, the same with a base of non-conducting gutta-percha, a filling or cap or crown after the root canals have been emptied and packed with some non-putrefying material, are the usual procedures.

Bridges and plates are used to artificially supply the place of extracted teeth.

Orthodontia.

The regulation of the teeth in their position in the mouth and the widening of the dental arches and palate have recently come to be an important part of the dentist's work. The leaders

Fig. 135.—Four models of the same mouth, showing scarcely any lateral growth for three years, then a lateral enlargement of 1 cm. in seven months by mechanical treatment (expansion arch).

in this development of scientific dentistry bear in mind that the first molar tooth is the most important of all teeth, because it is the center or keystone of an arch extending from the incisors back to the wisdom tooth in each quadrant; they realize the

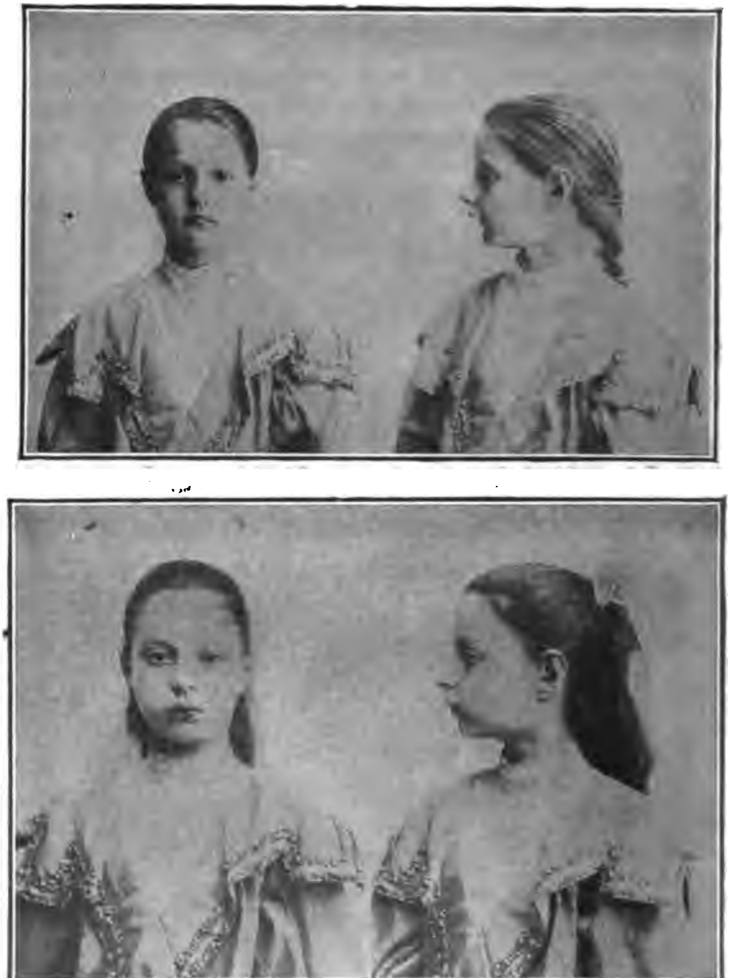


Fig. 136.—Photographs showing improvement in facial appearance after four months' mechanical treatment (expansion arch).

relationship between nasal obstruction and the high, narrow, contracted palate, and the necessity of more space for a good permanent dental arch than the space which is barely sufficient for a good-looking temporary arch. Preventive measures in their hands include the gradual widening of the contracted arch (and

palate) by mechanical means, coincidently with the removal of the causative adenoids. The widening of the dental arch in advance of deformity, if the temporary teeth be too closely packed together, is also advised. As has been said before, the preservation of the first permanent (6-year) molar is the first article of the orthodontist's code.

I am much indebted to Dr. E. A. Bogue, of New York City, for the accompanying illustrations showing different deformities and the results of treatment, as well as for the illustration showing the full-sized crowns of the permanent teeth *in situ* behind the roots of the still-existing temporary teeth. Dr. Bogue's eminence in this field makes comment upon the results shown unnecessary. The details of the mechanical appliances used in this special work are frequently discussed in the various dental journals.

THE NERVOUS SYSTEM.

DEFECTS AND DISEASES OF NERVOUS SYSTEM.

The defects and diseases of the nervous system are frequently related to each other, so that independent consideration of each group may be misleading to the student. Thus, nervous exhaustion shades insensibly into hysteria, lack of emotional control may amount to emotional insanity, intellectual development and emotional control in the average case exist together in inverse proportion, while researches in heredity show a close family relation between certain nervous and mental disorders. For the sake of systematic teaching, however, it is necessary to classify the diseases and defects into groups with the understanding that each of the latter possesses some principal and distinguishing characteristic.

The term *functional* as contrasted with *organic* signifies that apparently no gross defect or damage of the nervous system exists with the disease. It is evident to the thoughtful reader, of course, that no perversion of function can occur without an altered condition of the nerve cell, even though this be too fine to be distinguished by the eye. The distinction is one of convenience, and it is agreed that a nervous system showing functional disorder is one which shows no changes to the pathologist if examined after death.

The diseases and defects of the nervous system occurring in school children may be divided into the following five groups:—

I. Functional Nervous Diseases.
II. Organic Nervous Diseases.
III. Deficiency in Emotional Control.
IV. Psychic Disturbances of Adolescence.
V. Mental Deficiency.

I. FUNCTIONAL NERVOUS DISEASES OF SCHOOL CHILDREN.

(Nervous Disorders of School Children.)

The study of nervous disorders is greatly simplified by reason of the fact that many apparently diverse affections are often expressions in different degree and manner by different parts of the nervous system of the same faults.

The following propositions may almost be taken as axioms in the study of neurology:—

1. *Increased sensibility and irritability, rapid fatigue, and lack of emotional control are the three fundamental conditions underlying the various nervous disorders named in the next paragraph, and existing in these disorders either singly or in combination.*

2. *Neurasthenia, hysteria, epilepsy, migraine, habit-spasm, chorea, and neuralgia are expressions of the three conditions just mentioned, manifested singly or in combination. The more severe of these, epilepsy, hysteria, and migraine, are frequently found in persons of the same family.*

3. *Heredity influences the nervous system more than it does any other tissue. Original stability, on the one hand, or an inherent weakness and tendency to exhaustion, on the other, largely predetermine the existence of nervous health or disease in childhood.*

4. *The principal exciting causes of nervous disorders are anemia, reflex irritation, intoxication of the system, and injury of the brain and spinal cord.*

CAUSES OF NERVOUS DISORDERS.

The causes of the nervous disorders of children are both predisposing and exciting.

Predisposing Causes.

The principal predisposing cause is an inherent weakness and irritability of the nervous system,—the so-called *neurotic constitution.*

In turn this condition of weakness and irritability is itself usually hereditary and the definite result of low nervous, mental, physical, or social standards in the parents, such as feeble mind, developmental insanity, alcoholism, hysteria, nervous exhaustion and the nervous disorders hereafter described. In so far as the nervous system is concerned, there frequently appears to be an inheritance of acquired characteristics. It is seldom that a case of feeble mind, insanity, idiopathic epilepsy or pronounced nervous exhaustion without adequate cause, occurs in a family that is free from nervous taint. *Old age* of the parents may be a cause of poor nervous constitution, since it is recognized that the children of those who have passed the prime of life before marriage do not as a rule possess the virility and lively animal spirits marking other children and are likely to grow up somewhat lacking in nerve force. How much of this is due to a decrease of the virility of the parents, and how much to the repression of energy arising from the association of a child with old people rather than with other children is difficult to determine.

Alcoholism of pronounced degree is interesting as a factor in the production of neurotic children, because it furnishes an example of chronic poisoning lasting over several years before death of the tissues results. Post-mortem examination of the kidneys, liver and blood-vessels of a drunkard reveal to us the profound changes in vital organs which may result from soaking them year after year in a dilute solution of alcohol, and suggest that the pickling of the cells of the body generally may affect the germ cells to the detriment of offspring.

Lack of vigor and of nervous stability, if present, are manifested early in life. Indigestion will produce convulsions in one baby and not affect another. A healthy school girl will endure without apparent effect a shock or fright which produces an emotional outbreak in her classmate. Adolescence is a period during which these morbid tendencies are particularly manifest, owing to the profound disturbance incidental to the evolution of many of the glandular structures and nerve centers. Occurring as it does coincidently with school life, irreparable damage is often inflicted on neurotic children by the double strain thus imposed upon them.

Exciting Causes.

The exciting causes of nervous disorders are (1) poor general health, (2) *improper social habits,* (3) vicious personal habits, (4) overstimulation, (5) intoxication.

1. *Poor General Health.*—This may be the expression of numerous influences, particularly poor nutrition, anemia, organic heart and kidney disease, or the depressing poisons of some recent infectious disease, such as typhoid fever or diphtheria.

The explanation of the relation between lowered general health and nervous disorder is a very simple one. The nervous system suffers from starvation or intoxication in common with other parts of the body, but its delicate and complex character makes it extraordinarily liable to injury and difficult to repair.

2. *Improper social habits,* such as late hours, loss of sleep, overwork, uncongenial work, unhappy home life, and the general depressing effects of poverty, all lower the vitality of the nervous organization and predispose it to exhaustion.

3. *Vicious personal habits,* including intemperance, are among the most powerful of influences contributing to this same end, and if indulged at the critical adolescent period, when rapid development and internal readjustment are disturbing the nervous balance, they may be considered as actually exciting rather than predisposing causes. Unfortunately, the victims are of the very type destined to suffer most from any depressing influence. Their vivid imaginations, weak will power, and emotional nature make them an easy prey to such attractions as dissipation may offer.

4. *Overstimulation* of the nervous system (with consequent exhaustion) may be due to reflex irritation resulting from eye-strain,[1] postnasal adenoid growth, indigestion, intestinal worms,

[1] In astigmatism the strain on the ciliary muscle of the eye, from its constant contractions while endeavoring to obtain a focus, frequently results in the most violent headaches, and occasionally in irritability of temper, emotional outbreaks, nausea, and lassitude from nervous exhaustion. Acknowledging the exploitation in the daily press of adenoid growths as the cause of almost every juvenile trouble, there is no doubt that they exert a most powerful influence on the nervous system of their possessors. Medical and other scientific journals frequently present communications calling attention to mental deficiency, stupidity, lack of mental concentration and of memory, headache, dyspnea, incontinence of urine, reflex cough, chorea, habit-spasm, night terrors, irritability of disposition, and epileptic convulsions as the result of this condition.

and menstrual disorders. Particularly do nervous symptoms arise from astigmatic eyes, and from nasal obstruction. Certain organic brain diseases, particularly the cerebral paralysis of childhood (discussed in a following paragraph of this chapter), may make the nervous system very irritable.

Exhaustion may also be the result of continued *mental irritation from friction at home or at school.* Particularly is a high-strung school teacher an unfortunate guardian for a nervous child, since two such emotional, poorly controlled natures react badly on one another to the misery of both. A nervous, poorly disciplined mother is a still worse influence on the child than an unsuitable teacher, and unfortunately in the class of children under discussion she usually exists.

Three subjects of complaint under our existing school conditions appear to be (1) the forcing of children by reason of too early entrance into school, (2) the multiplicity of subjects and necessity of homework, (3) the inelasticity of the school curriculum.

The forcing of a dull child into the limits of the regular school curriculum may be justified as an economic necessity, but the pushing by ambitious parents of a precocious, high-strung, neurotic child through school at a rapid rate is one of the most condemnable proceedings possible. Such parents in their ambitions appear totally oblivious to all considerations of health and the events of the future. The writer knew well a professional man married to a college-bred woman whose oldest boy, always delicate, was remarkably precocious. At the age of 7 he was reading Latin; at 9 a fair musician; suggestions to the father that such a child needed physical rather than mental training were always met with the reply that the boy was not urged to study and that therefore it was unreasonable to suppose that harmful results could issue. The writer last spring saw this boy, now a youth in college. He was anemic and exceedingly nervous, a hesitating, tremulous voice and congested, blinking eyes being particularly noticeable. The eye condition was not due to neglected refractive error, but to the poor nutrition, as the oculist who examined his eyes shortly afterward informed me.

Overstimulation may occur as a *single severe shock.* Thus emotional disturbance, particularly fright, is causative of general

nervousness and of such special nervous symptoms as hysterical attacks, epilepsy, enuresis, disturbed sleep and chorea. Contrariwise the most narrow escapes from dangerous physical accidents usually make but little impression. Healthy children are repeatedly mentioned in the daily press as half-drowned, or rescued from burning buildings, but resulting nervous disorders are actually rare because danger is not appreciated until the imaginative faculty is developed. The average boy will carelessly risk life and limb, stealing rides on street cars and wagons and climbing poles and roof, although he may be fretful for hours if scolded by his teacher, and paralyzed with terror if suddenly seized by a policeman for throwing a snowball. The viewpoint of the child is far different from that of the adult, a fact which cannot be too strongly emphasized.

5. *Intoxication* of the nervous system may be caused by numerous agencies such as kidney disease, gout, alcoholism, constipation and drugs, but fortunately only one of these, constipation (with indigestion), need be considered in the study of children. Indigestion and constipation are the principal causes of epilepsy, of acute rheumatism, chorea and headache. Probably a condition of faulty metabolism akin to gout exists in many children, with resulting nervous and skin manifestations, but too little is known at the present time to warrant more than this passing mention.

It is well at this place to say a few words on the *influence of alcohol and tobacco* upon the nervous system. Newspaper items are occasionally seen relating the death at advanced age of some old man who has drunk and smoked steadily throughout his life without apparent deleterious effects. In fairness these cases should be acknowledged, but on the other hand it should be remembered that every almshouse and reformatory contains numerous specimens with health broken and nerves wrecked through drink. Regarding the effect upon the offspring of moderate, steady drinking and smoking on the part of the parent the deterioration in these cases is slow and, like the deterioration caused by overstrain from work and the dissipations of city life, requires several generations to manifest its full effect. For instance, the husky farmer's son freshly arrived in the city may be able to use a remarkable quantity of alcohol

and tobacco without apparent ill effects either at the time or during the course of years. He will also be able to work longer and endure more than his city-bred associates. His children, however, while still healthy, will not be able to consume the same quantity of stimulants and narcotics nor will they possess the father's endurance. Under a continuance of the same conditions the fourth or fifth generation will yield a typical product of hereditary nervous weakness, exhibiting such an intolerance to alcohol and tobacco that intoxication and acute illness result readily from the consumption of but small quantities. Once in this condition, the task of raising the health standard of the nervous system is just as slow and difficult as the previous work (unconsciously done) of breaking it down.

Intolerance of the system to alcohol and tobacco are cardinal reasons for abstinence from them. It will thus be seen that the question of the use of alcohol and tobacco is a matter of health, entirely aside from moral and economic issues.

MANIFESTATIONS OF NERVOUS DISORDER.

Most frequently the manifestations of nervous weakness are mild and too irregular in character to admit of a more exact designation than the general one of nervousness, nervous exhaustion, or neurasthenia. For the same reason the subjects of nervous exhaustion of mild degree are simply termed *nervous children*. Certain groups of symptoms, however, occur frequently enough to admit of classification as definite nervous disorders. The most common of these are chorea, habit-spasm, hysteria, epilepsy, and headache.

The essentials of a healthy condition of the nervous system are power and endurance in muscular movement, a sufficient but not excessive degree of sensibility, and a reasonable control over emotions. Conversely the most prominent characteristics of a weak nervous constitution are (1) motor weakness, (2) oversensitiveness and (3) lack of emotional control.

Irritability is the property of responding to stimulus, and increased irritability may be given as a fourth characteristic. However, it should be remembered that increased irritability is due as much to the increased sensibility already mentioned as to an unstable condition of the motor nerves.

1. *Motor Weakness.*—Children in whom this condition exists are often so listless and adverse to activity that their lack of animation readily distinguishes them. A more frequent condition and therefore even more characteristic is rapid fatigue. The children of this numerous latter group start the day refreshed by the night's sleep and in the morning may display exuberant vigor and spirits.

The nerve centers rapidly tire upon mental or physical effort, however, and a degree of exhaustion ensues which is in striking contrast to the apparent healthy condition of the period a few hours previous.

A poor control of muscular movement (poor co-ordination), if present, signifies that the motor centers are not acting in harmony owing to weakness in them or to lack of development of the association nerve tracts connecting them. A lowered tone of the sympathetic system may result in a general poor circulation with cold hands and feet, in excessive perspiration on slight exertion, and in attacks of palpitation of the heart.

2. *Oversensitiveness.*—1. Annoyance by loud sounds and bright light are symptoms due to hypersensitiveness of the auditory nerve or of the retina. 2. Hypersensitiveness to heat, cold and pain may be manifested by the general nervous system. 3. Hyperirritability of the sympathetic system is shown by too ready flushing, often to an uncomfortable degree. 4. Irritability of the motor centers leads to involuntary movement. This may merely be a condition of restlessness or fidgets, or may be severe enough to be classed as chorea or as habit-spasm. In quiet children this condition may be betrayed only by a tense expression of the face, or by involuntary movements of the muscles of the forehead or jaw, or perhaps by general restlessness.

Excitement on slight provocation is evidence of brain irritability, and the gesticulations frequently accompanying excited speech furnish a common instance of the increased irritability of neighboring brain centers which ordinarily are not affected. This condition may be observed in the shrill tones unconsciously acquired by earnest speakers, especially when under the nerve strain incident to difficult work. The pitch of the voice constantly rises as the excitement increases, so that in extreme cases of nervousness it becomes very marked.

It would be a grave error, although one scarcely possible of occurrence, to mistake an excess of energy in a healthy child for irritability due to weakness. A vigorous boy, full of animal spirits, does not exhibit the drooping figure, rapid fatigue, and emotional temperament of the neurotic child.

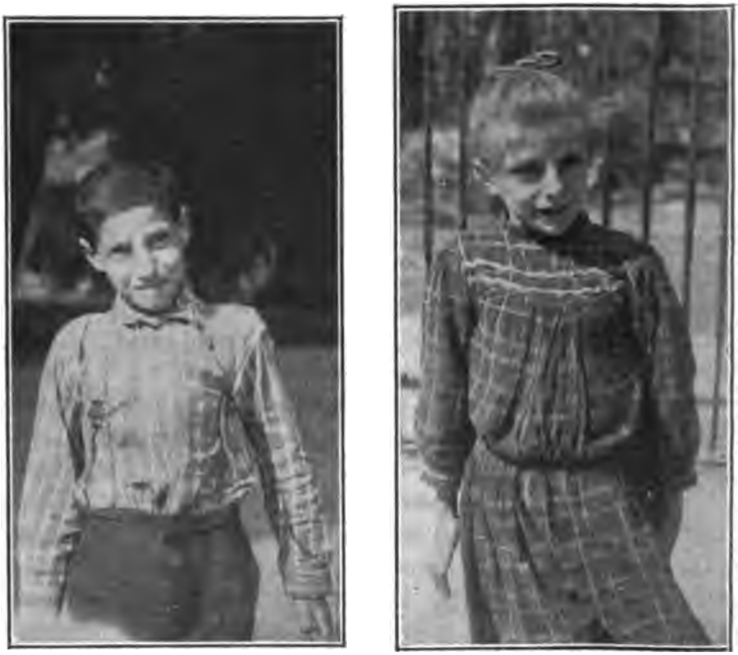


Fig. 137.—Nervousness with tension.

3. *Lack of Emotional Control.*—This is evidenced by weeping, laughing, or outbreaks of anger on slight provocation. Other symptoms more or less related are great sensitiveness to criticism, weak will power, craving for sympathy, a vivid imagination, and a tendency to magnify real or imaginary misfortunes.

The signs of nervous exhaustion and their significance once understood, the recognition of the various nervous symptoms displayed by school children becomes a comparatively simple matter. A list of those most commonly occurring is given below, both for its practical help and as a demonstration of the applicability of the scientific truths just stated.

These nerve signs of fatigue are most marked at times when the child is tired, worried, or excited. Approaching examinations and entertainments are therefore particularly favorable seasons for the observations. The depression of spirits incident to the low atmospheric pressure existing before a rainstorm produces a condition of nervousness well recognized by teachers.

General Nervousness ("Nervous Children").

By far the greater number of these children cannot be classified more accurately than by the general appellation "nervous," owing to the large number of possible symptoms and their numerous combinations. The general characteristic of weakness and irritability in body and mind is present in all, and this is best seen in those parts of the body possessing the most delicate nervous organization, namely, the face, the hands, and the general speech apparatus. For this reason, trembling or tensely held hands, quivering lips, husky voice, and feeble or jerky articular speech are the most peculiar signs of nervousness in a child. Stuttering is considered defective speech. The following may be noted by the teacher:—

(*a*) BY OBSERVATION:—

Lowered nerve tone with irritability.

Face:
- Great mobility of expression.
- Wandering of the eyes.
- Twitching of the muscles of the eyes and mouth.
- Grinding of the teeth.

Extremities:
- Twitching of the fingers.
- Peculiar and jerky handwriting.
- Shuffling of feet.

Body:
- General restlessness.
- Frequent movement and changes of position, either spontaneously or on trifling cause.

Abnormally quick reaction or response to stimulus.
- Associated purposeless movements upon emotional disturbance or excitement, such as involuntary winking, protruding of the tongue, laughing, waving the hands, etc.

A shrill voice.

Rapid stuttering or stammering speech.

Irritability of temper. Outbreaks of passion. Other emotional outbreaks. Ready laughing or crying on slight cause.

Lowered nerve tone with exhaustion.

- *Face:*
  - Toneless apathetic expression.
  - Eyes dull.
- *Extremities:*
  - Nerveless drooping position of the hands and arms when extended forward.
  - Slouching gait.
- *Body:*
  - Drooping shoulders.
  - Poor station and balance when standing.
- *Inattention.*
- *Mental dullness* and stupidity.
- *Poor memory.*
- *Sighing and yawning* from poor circulation.

(*b*) BY TEST:—

Test vigor by asking class to sit straight.

Test control by asking class to sit perfectly quiet for five minutes.

Test motor power by asking child to place fingers on desk, and then tap desk rapidly with the forefinger.

Examination periods, those devoted to such occupations as sewing or drawing, and also the recess hour, are especially favorable times for observation.

(*c*) BY STATEMENT OF THE CHILD:—

Fatigue, headaches, morbid fears, and apprehensions.

(*d*) FREQUENTLY ASSOCIATED CONDITIONS:—

Physical defects (eye-strain, adenoids, indigestion) which act by reflex irritation.

Poor nutrition and anemia, which starve the nervous system as well as the other parts of the body.

Mental dullness, which, if not due to evident physical cause, *signifies defect in the entire nervous system.*

Nervous exhaustion in which emotional manifestations are particularly prominent is described in the succeeding paragraphs on hystero-neurasthenia.

Chorea (St. Vitus's Dance).

This is the most frequent of the nervous disorders of childhood, and is characterized by jerky, irregular contractions of muscles. Associated conditions not sufficiently emphasized in many books describing the disease are mental irritability and weakness of the muscles affected.

The causes of chorea are those already given for the group of nervous diseases now under consideration. Especially rheumatism (probably one-half of all cases) and poor nutrition, and, in the opinion of the writer, indigestion with intestinal putrefaction, are causes.

As might be expected, nervous fatigue or excitement makes the condition worse, and so chorea is particularly seen in the springtime, a season associated with tired nerves. One author has remarked that chorea is "a school-made disease." The great majority of cases of chorea occur in children between the ages of 5 and 15 years.

The symptoms of chorea are chiefly motor and psychic.

Motor.—In the mild cases, restlessness and inability to sit still are the only visible signs of inability to control the muscles. Jerking of the head, grinding of the teeth, spasmodic twitching of the face, and shuffling of the feet are common.

In the more severe and well-defined cases, involuntary, irregular, jerking movements of the limbs are present. These take the child out of school, and may become so severe that the child is not able to dress, to hold anything in the hand or even to talk. A well-defined case of chorea, tossing in bed, jerking movements of the hands and arms never ceasing while awake, can never be forgotten.

Weakness of the affected muscles has been already noted and is naturally most marked in the more severe cases.

The writer recently had under his care a young girl suffering from chorea who was unable to use her right arm and hand for such simple acts as buttoning her dress or holding a teaspoon. This weakness of the finger muscles, however, was scarcely noticed by the family because of the occurrence of the more spectacular jerky movements. This young girl bruised her hand by repeatedly tossing it against the nearby furniture. On two or three occasions a spoon, after having been grasped with difficulty, was flung violently across the room. Desirous of escaping attention she practised the trick of sitting upon her hand in order to control it.

Psychic Symptoms.—The association of these with the muscular movements should always be borne in mind. Irritability of temper is very characteristic, and emotional outbreaks during

the day and bad dreams at night result. (See also Lack of Emotional Control, p. 349.)

Illustrative Case.—Case of chorea with extreme mental irritability. John S., aged 7 years. Robert Morris School.

Teacher's report:—

"He makes grimaces and frowns for no evident reasons, his face seldom being in repose. His fingers are always in motion. As he writes he distorts his mouth and his writing is very nervous. His pencil, when held ready for use, trembles. He usually speaks in a thin, whining voice. His condition will perhaps be more clearly indicated by the following specific instances of his behavior:—

"His hands and wrists were resting on the desk and he was silently reading from the board a poem preparatory to answering questions about it. During the time that his attention was there, both arms, sometimes from the shoulder and sometimes from the elbow, were continually making short movements (such as one might make were he erasing lead-pencil marks).

"While reading silently from his book, instead of allowing it to rest on his desk, he shook it, using movements similar to the above.

"During a reading lesson, when it is not his turn, he frequently unexpectedly reads several words aloud.

"In arithmetic he has called out numbers irrelevantly.

"When kept to do work which he had neglected he for a time refused to do it, stamping his feet and sobbing distressingly. He gradually became calmer and did his work, interspersing it with an occasional heartrending sob. His work was finally completed and after a heart to heart talk with his teacher, he went home in a very peaceful mood, the storm entirely over.

"He has suddenly grasped a child and held him tensely.

"While writing he has quickly stopped, laid his pencil down and pounded fiercely on his desk or stamped his feet. There was no apparent provocation and when his teacher looked at him, he hung his head, frowned and gave evidences of being ashamed of this outburst."

The recognition of chorea is important for three reasons: 1. That it may be treated early in its course. 2. Because its existence signifies something wrong—the existence of rheumatism, or nerve exhaustion, or poor nutrition. 3. Because it absolves the unfortunate victim from the charge of malicious intent in making grimaces at the teacher, being noisy, restless and troublesome, and of dropping articles with apparent carelessness. This is most important from practical as well as humane considerations, since punishment only makes the symptoms worse.

Every difficult child should be examined mentally because of the possibility of nervousness and chorea.

The treatment of chorea is the medical treatment of the underlying cause, and the avoidance of overwork from too many studies and insufficient relaxation. The teacher should guard these cases carefully, as the treatment of nervous disorders particularly demands her co-operation. Without doubt all these children are best treated by a return to a care-free country life, but, of course, this is usually impracticable.

Habit-spasm (Habit-chorea).

This resembles chorea and may possibly be a variety of it. Habit-spasm is observed among children in the lower grades, and consists in the habitual sudden contraction of certain muscles. The regions of the eyes, mouth, neck and shoulders are the most commonly affected. The spasm may be quick, almost instantaneous, or may last for one or two seconds, while the face is distorted by the tense muscles. Shrugging of the shoulders is a fairly frequent symptom, and I have frequently noticed in overworked college students a spasmodic clenching of the jaws occurring every few seconds.

When the eyelids are blinked forcibly and frequently, the condition is termed blepharospasm, and it is usually significant of eye-strain in a nervous person.

Facial habit-spasm is often associated with frequent sniffing of the nose. So many of these cases arise from adenoids and nasal catarrh that the quick nervous character of the movement rather than its simple occurrence is necessary to make this sign a suspicious one.

The chief features which help to differentiate habit-spasm from chorea are the usual existence of a local rather than a general cause (*i.e.*, eye-strain rather than rheumatism or nervous shock), the limitation of the affection to the face, neck and shoulders, and the repetition of the same muscular movement more or less rhythmically. The contraction of the muscles is spasmodic and powerful, and quite different from the wild, jerky and irregular movements of chorea.

Habit-spasm is a hint both of a nervous constitution and of local physical defect. The treatment should therefore consider both. Most cases recover, some lasting only a few months. Rarely it becomes chronic and incurable.

A few days previous to this writing I examined a 10-year-old boy at the Miller school, who was suffering from habit-spasm. He frequently drew down his lower lip in a spasmodic manner, showing the lower teeth conspicuously. His eyes, nose and throat proved to be normal, but he was poorly nourished and nervous. The knowledge that he was being observed made the facial grimace particularly noticeable. He had a bruise upon the forehead, and the principal asked its source. "My father kicked me there." "Why, Joe, I thought your sister hit you there with a flatiron." "That was here," he replied, and exhibited another wound behind the left ear.

Epilepsy.

Epilepsy is a habitual disposition to and an occasional occurrence of convulsions which are accompanied by loss of consciousness.

The tendency of medical writers is to look upon persons suffering from epilepsy as divisible into three classes according to the nature of the cause of the attack: 1. Individuals possessing an exceedingly unstable nervous system, who require very little to precipitate an attack. 2. Those with more or less instability of the nervous system, but with some evident exciting cause, such as eye-strain, intestinal indigestion, postnasal adenoid growths, etc. 3. Those persons possessing an originally sound and healthy nervous system, but afflicted by some overwhelming poison, as in Bright's disease, or by the pressure of a tumor, or by injury.

The convulsions of babies[1] are not considered as epileptic in character unless the habit becomes established.

The symptoms may be here very briefly described, to relieve the inexperienced teacher of alarm and uncertainty, and to call attention to the occurrence and sinister significance of the minor form, and the psychic form of the disease.

Major epilepsy constitutes the ordinary epileptic convulsion. Its onset may be instantaneous, but usually the brain disturbance causes various premonitory symptoms, such as numbness and tingling in one of the extremities, or flashes of light or color before the eyes. The actual convulsion frequently begins with an inarticulate cry on the part of the sufferer, who falls regardless of disastrous results. The muscles of the entire body are at first rigidly contracted, causing inability to breathe and an apparently alarming congestion and blueness of the face for some time less than a minute. The rigidity ceases soon because of the exhaustion of the nerve force and probably by reason of the partial asphyxia; the contractions continue, but become jerky and intermittent in character with a beginning of return to a more natural color. Frothy saliva, possibly bloody from a bitten tongue, shows at the mouth. This stage lasts two or three minutes (rarely longer), and is succeeded by a third stage of stupor due to nervous exhaustion, from which the patient can soon be aroused if necessary. Such persons usually suffer for several hours from headache and fatigue, a few appear to be scarcely affected, while others may be incapacitated for a day or two.

The treatment of the attack is conducted with the assurance, born of experience, that the patient will speedily recover if not injured accidentally by the fall. The clothing should be loosened at the neck to allow free respiration, and an endeavor made to secure privacy for the sufferer and safe custody for his personal property. A handkerchief should be inserted between the teeth, to prevent injury to the tongue.

[1] It is worth while digressing to explain the fact that the principal cause of convulsions in infants is indigestion due to infection (infected milk) or improper food (cows' milk and indiscriminate feeding). The mistaken belief that the eruption of the teeth is the causative agent is due to the fact that the latter occurs coincidently with the weaning period, and at times undoubtedly causes distress to the child.

Minor Epilepsy.—This may be defined as habitual, or at least occasional, periods of lost nervous control. The attack presents a great variety of symptoms in different subjects and is diagnosed by its periodical occurrence, by the fairly constant character of the symptoms in each person affected, and by the (almost) certain occurrence of loss of consciousness, though this is so transient that it may not be noticed unless a dish is dropped from the nerveless hand or conversation stopped in the middle of a sentence, with more or less subsequent mental confusion. Peculiar automatic actions and a few irrational words may betray the condition. Parents are frequently cognizant of such attacks of minor epilepsy, but fail to realize their true significance, and carelessly speak of them as "spells,"—a medical wastebasket for uncertain diagnosis.

Psychic Epilepsy.—This, like minor epilepsy, must rest its claim for existence in each case upon the fact that it is either of habitual occurrence or that the patient suffers also from one of the other forms of epilepsy. Psychic epilepsy exhibits a loss of control (inhibition), and *action* results rather than *inaction*, as in typical minor epilepsy. The attack usually consists of sudden maniacal excitement, aptly described as a brain-storm, often accompanied by violent automatic movements. In the mentally irresponsible state existing, articles may be recklessly destroyed, or an assault committed. The ensuing mental calm is in striking contrast to the emotional outbreak.

Unless epileptic convulsions coexist, really uncontrollable emotional outbursts are better classed as emotional insanity (possibly acute mania).

A knowledge of epilepsy is valuable to the teacher as well as the physician, since the former possesses facilities for observation second only to those of the family and is often much more discerning.

First it should be realized that children suffering from convulsions are frequently curable if only the cause is found and removed before the fit habit is established. The unthinking doctor doses his patients with bromides until a pimply complexion, dyspepsia, and a deadened intellect all attest the vigor of his treatment. The convulsions become less severe and less frequent, and this is considered a fair equivalent for the practical

invaliding of the sufferer. This is a necessary procedure of last resort in severe and proven incurable cases, but the scientific and proper treatment of epilepsy is based on the theory of the removal of the cause if such procedure be possible. For this reason, the causes of nervous disorder already mentioned should be considered carefully one by one, with especial attention devoted to the examination of the stomach and the bowels, the eyes, and the nasopharynx.

The most important point is the recognition of the true character of minor and of psychic epilepsy when actually seen. The former because the minor forms have all the potential significance of the major and may develop into it if not checked. The latter because of the paramount importance of recognizing psychic epilepsy, or kindred emotional disturbances occurring in ill-balanced children, in order that the child may be shielded from exciting shocks and terrifying punishments, otherwise very liable to fall to him.

Needless to say, an ordinary fit of bad temper should not be taken as a case of psychic epilepsy, or an absent-minded movement construed as an attack of minor epilepsy. The repeated occurrence of these, however, should give rise to a suspicion that abnormal conditions exist, and cause a quiet inquiry into the child's home life, the nervous health of the family, and the existence of physical defects of the character already discussed. The diagnosis of such cases carries with it such heavy purport that it should be only tentatively made by any one not a physician.

Headache.

While the causes of headache systematically considered are numerous and practically correspond to those of other functional nervous disorders, such as epilepsy and chorea, it may be said definitely that eye-strain is the basis of at least four-fifths of the habitual headaches occurring in school children. The remainder arise from adenoid growths and obstructive nasal catarrh, and from constipation. A few cases may be ascribed to coffee combined with lack of proper nourishment.

Single accidental headaches result from injuries, indigestion, or beginning acute illness.

The headaches of eye-strain localized over the eyes are accompanied as a rule by discomfort in the eyes after their use, and by more or less imperfect vision. Astigmatism is particularly a cause of headache, and the minor degrees of error with little or no diminution in vision by the ordinary type test may cause much distress. It is my custom when children are referred to me in this connection to first ask whether the headache occurs frequently. *If it does* further inquiry is made as to tiring of the eyes after reading, which usually elicits an affirmative answer. The vision should then be tested with the ordinary type card and the diagnosis established.

The evident presence of adenoids, a statement as to the character of the breakfast (cinnamon bun and coffee) and the statement of constipation explain the remaining causes.

As to accidental cases, I have had a considerable number of children referred to me in whom the headache was the first one ever experienced and due to a blow on the head a few minutes previously. A hasty assumption of eye-strain by the teacher dependent on her own judgment would lead to a diagnosis easily susceptible of disproof and as mortifying as it is ridiculous.

A headache may be the most prominent symptom at the onset of some acute infection such as grippe or scarlet fever or tonsillitis. Children in this condition frequently omit mention of the accompanying general distress, chilliness and fever.

Treatment of Nervous Disorders.

This consists in each case in the removal of the causes and the improvement of the general health. Plenty of sleep, good food, fresh air, the avoidance of constipation, correction of nose and throat defects, eye-glasses and medication by codliver oil and iron are the principal measures to be considered.

The baneful influence of nervous parents upon a nervous child must be endured, as a rule, since the preservation of the family is a sociological maxim at once brought forth by family and friends in opposition to any attempt to remove the child to quieter and easier influences.

The school curriculum as a source of nervous exhaustion has been the subject of many papers read before medical and

educational conventions. As a rule, however, the lack of active co-operation between the two professions has resulted in complaints rather than the actual correction of existing ills. The first (?) step toward official co-operation and action was taken in 1909, at the annual meeting at Cape May, N. J. Here, at the suggestion of Dr. Alexander Marcy and the writer, a committee of three physicians was appointed to confer with the State educational authorities upon the school curriculum in its relation to the health of children. This pioneer action will doubtless pave the way for similar procedure in other States and eventually the retention by the school authorities in our large cities of a medical officer with expert knowledge of neurology.

The exclusion from school of very nervous children, like medical supervision of the curriculum, is frequently advocated, but seldom practical.

Children are occasionally withdrawn from school by parents on the advice of the family physician, but initial action by school teachers is practically unknown. Certainly, in the writer's experience, covering six years of medical inspection, no such direct suggestion has ever been made by a school principal. This is probably and naturally due to the practice of teachers to retain children rather than to dismiss them, to a natural obtuseness in the recognition of disease, and possibly to a transfer of responsibility for things medical to the inspector.

II. ORGANIC NERVOUS DISEASES OF SCHOOL CHILDREN.

The principal organic nervous diseases affecting children are three in number,—spinal paralysis, cerebral paralysis, and an uncertain group of symptoms resulting from meningitis.

Infantile Spinal Paralysis.

This disease, also termed acute anterior poliomyelitis, is the cause of the large majority of the withered arms and legs noticed occasionally in persons of all ages. Such paralyzed limbs, however, are but the permanent result of damage wrought in the course of a few days' acute illness, during which the motor cells

in some part of the spinal cord are destroyed. Three-fourths of the sufferers are under 6 years of age at the time of attack. In rare cases adults have been attacked. It is said that the occurrence of the disease bears no relation in the city to the character of the population, and in the country no relation to the general topography of the land nor to social or sanitary conditions.

Fig. 138.—Infantile spinal paralysis.

Personally, however, I have seen so many cases (*i.e.*, old cases attending the schools) among the poor Italians, compared with the number of cases seen elsewhere in Philadelphia, that a strong suspicion is natural that poor sanitation, overcrowding, dirt and unhealthy throats may be favoring factors.

Occasional epidemics of infantile spinal paralysis occur. In Norway, in 1905, over 500 cases occurred in a population of 2,500,000. During the last year, 1910, several epidemics have occurred in the United States, with resulting vigorous action by the State health authorities. In Pennsylvania, January to

August inclusive, 443 cases occurred, of which 100 cases occurred in Northampton County, 96 in Lancaster County, and 52 in Lehigh County, while a much less proportionate number, 68, occurred in the great city of Philadelphia. In the State of Massachusetts 100 cases have occurred in the vicinity of Springfield during the spring and summer of the same year.

Fig. 139.—Infantile spinal paralysis affecting outer calf muscles. (Note the right ankles.)

Cause.—No germ has so far been proven to be the specific cause, but the sudden onset, fever, frequent congested throat, and epidemic nature all point to its infectious nature. It is not actively contagious, although neighborhood epidemics and, rarely, its occurrence in two children of the same family make it probable that it may be transmitted from one person to another.

Evidence.—The child is suddenly seized with fever, and paralysis of its limbs. In severe cases the fever is high, the

disease may begin with a convulsion, the throat be reddened and congested, and the paralysis affect the whole body. One-fifth of all cases die during the first two or three days. In mild cases, even though total paralysis occurs (as it almost always does), the fever may be so slight and the infant so young that the mother is unaware of anything wrong at the time. The writer once saw such a case, probably several months after the occurrence, in which the mother brought her two-year-old child to the dispensary of the Presbyterian Hospital to ascertain why it could not walk.

After a few days there usually occurs a remarkable recovery in all the limbs save one, which remains permanently paralyzed. In some cases only a single group of muscles in one limb is affected. In after years, shortening of the limb, wasting of the muscles, loss of tendon-reflexes, and cold, congested circulation are the cardinal diagnostic signs. As in all paralyzed limbs, contractures of the affected muscles occur, causing such deformities as club-foot, or a twisted, withered wrist and hand.

Treatment.—The disease is incurable because the motor nerves supplying the paralyzed limb are destroyed. The standard measures of massage, electricity and tonic treatment do good in improving the nutrition of the limb and preventing the deformities from disuse of the part. If the lower limb be affected a shoe or shoe and brace should be worn to strengthen and lengthen the limb and thereby avoid curvature of the spine. In recent years, skillful surgeons have transplanted either tendons or nerves in suitable cases with remarkable results.

Infantile Cerebral Paralysis.

This disease, more rare than the preceding one, presents a paralysis resulting from injury to the brain. This injury usually occurs during a difficult labor, particularly if obstetrical forceps be required, but it may occur from inflammation of the brain substance or rupture of a cerebral blood-vessel during the first few years of life. The cause of the latter event is usually unknown. After recovery from the first shock or fever, a permanent paralysis remains, affecting usually one side of the body and often including one side of the face. In such cases it

is equivalent to an ordinary stroke of apoplexy occurring in childhood. In other cases both sides are paralyzed, so that the whole body is affected. In a few cases both lower limbs only are paralyzed. There is no marked wasting of the paralyzed limbs, although contractures and deformities develop. The paralyzed muscles show evidence of nerve irritation, and the tendon-reflexes, such as the knee-jerk, are exaggerated. For the same reason the hands and face often show spasmodic movements

Fig. 140.—Cerebral paralysis (causing also feeble mind).

when used for manual work or speech. Since the brain is the part actually injured, it is natural that not only paralysis, but feeble mind may ensue, and from a practical standpoint these cases are classed as mental disease. It is therefore very important to distinguish between spinal and cerebral paralysis. In the former, intelligence is normal, the paralysis is usually only in one limb, the tendon-reflexes are absent, and there is more wasting of the muscles.

Treatment.—There is no treatment other than massage to the muscles to prevent deformities, and special education if the child is mentally deficient. Of course, at the time of brain

injury, proper medical or surgical treatment is called for to reduce the extent of the damage done the brain.

Meningitis.

The effects of meningitis are not noticeable nor intelligible to any one not a physician, and they are here noted because meningitis in infancy, from scarlet fever, pneumonia, or menin-

Fig. 141.—Nervousness from cerebral hemorrhage in infancy. Left side partially paralyzed. Some mental deficiency. (Also note "adenoid face.")

gitis as a primary affection, is not a very rare occurrence. The result may be a partial paralysis (weakness) of the body muscles, defective sight or hearing, with special signs discoverable by examination of the chamber of the eye, defective mentality, and irritability of both the muscular system and the mind. Because the defective intellect or lack of emotional control are usually the chief signs in after years, the condition is classed with the mental diseases rather than those of organic nature. It is unfortunate that such cases of mild degree who

are found as dull, violent-tempered, and incorrigible children in our public schools do not display more clearly the accompanying physical defects which would make their condition better understood.

III. LACK OF EMOTIONAL CONTROL.

Emotive children are those who lack control of the emotions.

(The principal components of the mind are the intellect and the emotions. The intellect is considered in the chapter on Mental Deficiency.)

The fundamental emotions, according to MacDougall, are seven in number. Each is the subjective feeling which naturally accompanies a primary instinct:—

1. *Fear,* which is accompanied by the instinct of *flight.*
2. *Disgust,* which is accompanied by the instinct of *repulsion.*
3. *Wonder,* which is accompanied by the instinct of *curiosity.*
4. *Anger,* which is accompanied by the instinct of *pugnacity.*
5. *Subjection,* which is accompanied by the instinct of *self-abasement.*
6. *Elation,* which is accompanied by the instinct of *self-assertion.*
7. *Tender feeling,* which is accompanied by the *parental instinct.*

The most important general rule concerning emotiveness (or emotivity) is its existence *inversely to the degree of intellectual development.* For this reason emotiveness is found particularly among the feeble-minded, the dull, and the uneducated.

Exceptions to this rule should be borne in mind. (*a*) Many men uneducated in scholastic knowledge have acquired fair education and mental discipline from the character of their work. Such, for instance, are many railroad employés and mechanics. (*b*) There exist a minority of the mentally deficient in whom the condition of emotiveness is not present. (*c*) Among persons of neurotic temperament, as we have seen, a lack of emotional control exists and is often associated with fine intellectual development, even genius. (*d*) Persons suffering

from nervous exhaustion usually exhibit either hypersensibility, or rapid fatigue or exertion, or lack of emotional control, or combinations of the three. (*e*) Hysterical persons show lack of emotional control. (*f*) Certain insanities, such as mania and melancholia, are particularly characterized by excitement and by depression. (*g*) Cases of brain injury sometimes exhibit emotional disturbances.

In the feeble-minded the expression of the emotions is very easily seen because it is so characteristic. If affectionate in disposition a feeble-minded child will run up to a visitor and grasp her hand with wide smile and almost ecstatic caresses; if curious such a child will handle an object as soon as the teacher's back is turned, in spite of admonitions. (It is interesting to note that the only strong impression in the way of forbiddance is the warning of death. An imbecile child who is told not to play with fire because "it will kill you" usually remembers the warning.) Similarly the feeble-minded child grins and cries aloud with joy and easily weeps when sorrowful. In the feeble-minded of low grade, the emotional manifestations may not be *strongly* manifested, because of the weak will-power and intellect, but they are *constantly* manifested.

A corollary of the last statement is the general rule that *a mentally deficient child, who also shows peculiar traits, is probably feeble-minded in some degree.*

Among the better social class one may occasionally observe interesting actions indicative of emotiveness combined with inferior intellect. Among the guests at a recent clubhouse party was a young man, R——, whose father was the wealthiest citizen of the town. An inventive genius, his family unfortunately showed the mark of degeneracy by the existence of a feeble-minded brother, one or two other queer relations, and a simple-minded condition in the son first mentioned. The latter owned an automobile and took part in the social functions of the town, being received for his family's sake as well as his own good nature and willingness to do the work and be the butt of every enterprise. On the evening in question several songs and dances were well rendered, particularly one by three college boys in impromptu costume. The audience applauded and the music, or rather noise, increased. Unable to withstand the excitement

R—— hastily picked up one or two articles at hand, designed to make himself conspicuous, and joined the others, dancing clumsily and endeavoring to sing in the chorus. The audience laughed—at him, not with him—but he was oblivious to this and performed all the harder. One of the guests remarked *sotto voce* that R—— could always be depended on to furnish such an exhibition for the amusement of the others.

It is interesting to study the emotional control in borderline cases of feeble mind, and in the uneducated, because these classes furnish society with such a large proportion of its criminals. The boys in the truant schools and in reformatories strike at each other in such lightning displays of temper that one is reminded of the snapping of a wolf. Fifty times have I seen such boys returning to their seats from the teacher's desk, when apparently without cause a nearby boy would be struck at savagely.

It is utterly impossible to exactly apportion the cause for this between the home environment, the inherent mental peculiarities and the uneducated mind. Suffice to say that it *happens*, and when it happens on a larger and graver scale an assault and perhaps a murder is committed.

In the preceding section on Chorea, an illustration of poor emotional control due to a neurotic constitution is given.

Among factory girls, most of whom are imperfectly educated, poor emotional discipline is the rule. The condition is aggravated by the nerve-racking factors of poor food, bad factory air, late social hours, and bad sexual hygiene. It is not uncommon for girls in factories to have hysterical seizures. A great many of them act habitually like grown-up children, and their lack of control in case of accident or fire is marked.

As is shown in the chapter on the Prevalence of Defects, the greatest proportion of nervous children is found in the lower rather than the higher school grades. This does not relieve the school system from the charge of making nervous children—it rather means that the numerous group of defectives who are both intellectually deficient and emotive drop out of school. In the grammar grades are found a considerable number of emotive girls, and the medical inspector is occasionally called upon to see a girl who has suddenly cried hysterically and then

become ill and faint by reason of menstrual derangements. This condition is even more marked in high-school girls.

Cases of lack of emotional control due to brain injury occur. These are relatively small in number, but nevertheless quite numerous in the aggregate. The textbooks on crime cite many instances in which brain tumors, accidents to the head, sunstroke, and fevers complicated by meningitis have resulted in complete change in disposition, with irritability and outbursts of temper. Most of these brain injuries appear to include the factor of pressure on the brain substance, even if it only be by old meningitic exudate. Dr. H. Maxwell Langdon reports to me a remarkable case in point resulting from a brain tumor. A boy about 14 years of age had been sent to a private school for bad boys near Doylestown, Pa., because of bad temper and vicious actions. Convulsions developing, he was sent to the Orthopedic Hospital, Philadelphia, where a diagnosis of brain tumor was made. At this time the eye-ground examinations showed a papilledema of three or four diopters. A decompression (trephining) operation showed a malignant growth of the cerebellum, part of which was removed. The boy recovered from the operation with a most remarkable change of disposition, being now docile in temper and not in the least troublesome. He was discharged from the hospital. About ten months later he was brought back to the hospital because of the recurrence of the malignant growth. The eye-ground condition, which had cleared up, had now returned. The boy's disposition had become so irritable that he had recently thrown a plate and carving knife at his mother and had chased his sister with an axe. Again a trephining was done to relieve intracranial pressure. The bone being removed, the cerebellum (or rather the sarcoma mixed with it) bulged out through the opening. The material was removed with a sterile spoon, the remnant of the cerebellum being the central vermis. The boy again practically recovered, his temper once more becoming docile, and his gait, which was at first ataxic and staggering, improving to practical normality. Six or eight months later the boy died at his home from a second recurrence of the tumor.

Cases of nervousness and emotiveness resulting from reflex irritation in other parts of the body (see Impacted Teeth, Eye-

strain, and Adenoids) are mildly suggestive of the emotiveness seen after brain injuries, which sometimes reaches actual insanity. Dr. Samuel D. Risley tells me of a boy inmate of the Institution for the Feeble-minded at Elwyn, Pennsylvania, who was subject to outbursts of temper. Examination of his eyes showed not only a high degree of astigmatism, but extraocular muscle weakness, which tend to the turning up of one eye (hyperphoria). On these occasions the boy saw double. He was fitted with prismatic and cylindrical lenses, and at once he settled down to an interest in his shop work, with as good a disposition as any boy in the institution. The feeble-minded boy at Vineland who behaved better after the extraction of several teeth is elsewhere recorded. It is impossible to draw conclusions as to the exact *modus operandi* of cure in these cases. Possibly the first boy became well behaved simply because he could now see and take an interest in the things around him. Possibly the other boy behaved for fear of further extraction. His five companions were not affected by their operations. It is certain, however, that many are benefited, and it is reasonable, in view of headaches and earaches caused directly by eye and ear trouble, to ascribe many cures directly to the removal of a source of irritation.

Treatment.—When the cause is evident, and it usually is, the principle of treatment is simple. Unfortunately the results are usually poor because feeble-mindedness and also a neurotic constitution are permanent in their possessors. A solid education and good physical health are the things to be aimed for, since the light of reason is the greatest check on a hasty action, and a sound nervous system a great natural safeguard. In addition to these general preventives, specific measures may be taken by instruction in the elements of logic and ethics, unfortunately not given in American schools, and by plain talks to the children on the disadvantages of a hasty temper and unreasonable actions. Such simple and wholesome mottoes as those advising one to "count ten before you speak," to be cautious in criticism, and the biblical quotation that "he that keepeth his temper is greater than he that taketh a city" have an immense influence on children if taught and practised by their teachers.

Eye-strain, adenoids, indigestion, impacted teeth, and the

evidence of old head injuries should always be looked for in these cases. While the proportion caused by local pressure or irritation is very small, compared with those caused by mental deficiency and bad home training, they occur nevertheless, and cannot be cured without removal of the cause.

IV. PSYCHIC DISTURBANCES OF ADOLESCENCE.

Adolescence has been termed a second birth, and certainly it marks the beginning of extraordinary changes which transform the child into the adult.

Of the physical changes some are simply increased in size and power, bone and muscle, seen in the rapid gain in total height and weight, and particularly in the size of the heart. Development in some of the organs is also qualitative in character, the development of the sexual organs, the development of the glandular systems generally, the changes in the outline of the female form, and the new appearance of hair being examples of these.

The psychic changes occurring during adolescence are profound, and, coming, as they do, at a season of physical readjustment, may readily become morbid. Characteristic of this period are the opening up of the imagination, the beginning of the subconscious sexual attraction, the greater intensity and more lasting effect of emotions experienced, and the beginning of self-consciousness. Hence the adolescent boy or girl will frequently sit in a reverie, absent-minded, oblivious to the school-room life around, while the imagination creates highly colored pictures and day dreams. The self-consciousness now seen is particularly present when in the presence of the other sex. More care is given to the details of dress, the conversation with playmates is likely to be on the topic of boys and girls (*i.e.*, the opposite sex), although many quiet children develop a secretiveness which conceals the true trend of thought and gives the impression of indifference.

Many animals pass through a period of lessened resistance fraught with danger of disease or injury. The soft-shelled crab and the molting bird are examples. At these times shelter

rather than exposure should be sought, but the civilized human introduces his adolescent young into the high school and the factory, endeavoring to break down the already weakened vital resistance, and to overstimulate the nervous system at the period of its greatest irritability.

Predisposition.

What are the forces which tend to unbalance the youthful mind? First comes heredity, which powerfully influences the nervous system of the offspring (see pp. 325 and 368). Neurotic, insane, or feeble-minded parents or grandparents, parents who have ruined their health by overwork or dissipation, and possibly mothers who have suffered from debilitating disease during pregnancy are likely to produce children with unstable mind and nerves. Such children may suffer from convulsions or become delirious when suffering from only slight fevers, and often lack control over their emotions. They may show stigmata of degeneracy (see p. 398). When older they may be neurotic, very susceptible to the effects of alcohol, and unstable in purpose and resolution. Frequently they are silly. With them poor scholarship is the rule, but occasionally they are bright scholars.

Since about 20 per cent. of the cases of adolescent insanity (dementia præcox) have exhibited peculiarities from youth up ("seclusiveness, affectation, eccentricity, precocious piety, impulsiveness, moral instability"—Kraepelin), such signs should be interpreted as warning signals of an unstable nervous system which is liable to deterioration.

Exciting Causes.

The agencies which actually jar the juvenile mind from its balance are summed up in the expression *unhygienic habits.* Overwork, worry, frequent sexual excitation, alcoholism, religious or other excitement, are examples. Anemia is also caused by these and aggravates the nervous condition. Masturbation is probably a cause, but is also an effect of a broken-down nervous system. In the latter case it is due to the oversensitive nerves and overimaginative mind.

Autointoxication, which may occur from intestinal putrefaction or from poisons generated in the blood by worry and mental fatigue, is present in the majority of cases which go on into the condition of acute adolescent insanity. The unhygienic habits before mentioned may produce the insanity through the intermediate agency of these nerve poisons.

Manifestations of Slight Unbalance.

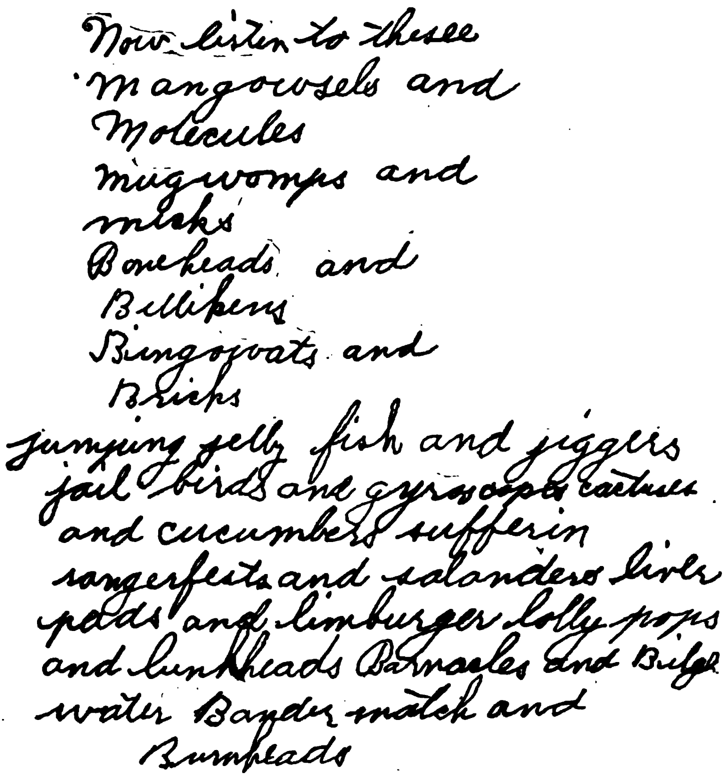
Teachers are familiar with the silly child, the dreamy child, the one who cannot center his attention. Many of these children are peculiar, but nothing more, and in time come out of the condition into normality again. A short time ago the writer examined a special class of truant boys. One of them, a quiet, well-behaved youngster, of Polish parents, named Sofronsky, showed mentality a little below his age (14), but, considering his environment, was looked upon as little worse than the average. He was doing fourth-grade work. His teacher called my attention to a habit on his part of sitting idly for considerable periods and another habit of writing queer statements on his paper or slate. That day he had written that a man had come along Second Street and asked him to go along with him. The teacher had picked it up after school. I asked for the next similar production, and the following day was presented by the teacher with the specimen on opposite page.

A scrutiny of this composition makes one wonder where a poor Polish-American boy could have picked up the words here written, aside from rhyming them.

Boys who are silly and not particularly bright are recognized by their fellows as such and are termed by them "nutty." I do not know whether this slang term is universal or local. There is no single-word medical synonym. There is a prevalent impression among boys that masturbation has something to do with the condition, and this belief is so common that it has some value as evidence.

Adolescent Insanity.

If the critical period results disastrously, mental deterioration may ensue. Such insanity is termed adolescent insanity,



Now listen to thesee
Mangowsels and
Molecules
mugwomps and
mleks
Boneheads and
Billikens
Bingoyoats and
Bricks
jumping jelly fish and jiggers
jail birds and gyroscope cactuses
and cucumbers sufferin
saugerfeits and salanders liver
pads and limburger lolly pops
and lunkheads Barnacles and Bilge
water Bauder-match and
Bumheads

Fig. 142.

or dementia præcox. The latter term simply means loss of mind occurring *precociously* (*i.e.,* early). The initial period of this disease is marked by mental fatigue and deterioration, but these are for a time obscured by emotional manifestations—particularly silliness and egotism. Soon, however, the inability to do mental work is apparent and then the inability to think clearly in the everyday concerns of life.

Dementia præcox presents too much subject-matter for its consideration here. The commonest form (hebephrenic form) shows chiefly the broken-down mind, with its confusion, weakness, and often silliness. Less common is the catatonic form, in which rigidity of various muscles, repetition of words, religious excitement, and docile response (or stubborn refusal) to sug-

gestions are seen. In young adult life is seen the least frequent form (paranoid form), in which delusions of persecution accompany the mental breakdown. The disease may be mistaken for hysteria, maniac depressive insanity, paresis, paranoia, and feeble-mindedness, and, therefore, only a physician should make the diagnosis.

Treatment of Psychic Disorders.

The treatment is mainly preventive. In its full scope it includes eugenics, whereby the unfit are discouraged from marrying and thereby producing delicate, unstable offspring; it includes medical inspection by the right kind of medical inspectors, who are watchful for signs of a neurotic constitution or the signs of a nervous breakdown; it includes a revision of our school system, with more emphasis on health and efficiency and less on the size of the curriculum; it includes the better teaching of children the laws of hygiene,—the effects of alcohol, tobacco, tea and coffee, vicious habits, late hours, poor ventilation and improper food; it includes child-labor laws which state that overwork prescribed in school and overwork in the factory are unlawful. A strong, vigorous body and right habits altogether abolish nervous disease.

Cure of nervous disorders of all sorts, like the cure of tuberculosis, is exactly along the lines of its prevention. It must be confessed that an inherited neurotic constitution once broken down is difficult and often impossible to cure. Even in such an event cure means only fair health with eternal watchfulness against another breakdown. In our schools are many children whose minds have been permanently injured by ill health, worry, and overstudy. With some of them the "overstudy" has been only a few hours' mental work each day done when in a nervous, broken-down condition. Most of the cases going on to insanity are hopeless, but no case in its beginning should be so regarded, as modern sanatorium treatment sometimes works a cure.

MENTAL DEFICIENCY.

MENTAL DEFICIENCY is an important subject to the educator, the physician, and the lawmaker. It is important to the community as a whole because of the taxation burden due to feeble-minded paupers, criminals, and illegitimate children. As a scientific subject it engages the attention of the psychologist, the sociologist, and the biologist.

The problem of the feeble-minded (of whom about two-thirds are degenerates) is a different and greater one than that of the dull children who lag along two or three grades behind in school. There are so many indeterminate border-land cases, however, that the two groups are best studied together under the general caption of mental deficiency.

DEFINITION AND CLASSIFICATION.

All children who are incapable of doing ordinary school work under fair conditions may be termed *mentally deficient.* This first grouping is primarily practical, based on the requirements of public school work, and includes alike the feeble-minded and those who are simply very dull.

The mentally deficient may be separated into three groups:—

Dull.

Border-land (real or apparent).

Feeble-minded.

DULL CHILDREN.

Dull children are those who fail to do ordinary school work satisfactorily, but who are, nevertheless, normally intelligent in everyday words and actions, and are not markedly peculiar.

The permanence of mental dullness in a child is uncertain. Some stay dull in spite of hard effort to improve them; others improve to fair mentality under the spur of extra work by teacher

and pupil; others improve apparently spontaneously at a later period and become average- or even brilliant- minded persons.

There seems to be no doubt that the bulk of the dull small children are permanently so. This fact is brought out well by Dr. Charles A. A. Miller, of Baltimore, first in a paper published in the *Psychological Clinic* of October 15, 1909, and later more fully in a personal letter to the writer of this article.

Dr. Miller, in the year 1901, investigated the children in a first-grade class containing 43 pupils and classified them into three groups according to their mentality as expressed by their scholarship. Owing to the death or removal of 10 children, the series was reduced to 33. Starting together in the same class in 1901 the subsequent school standing of the children in 1909 was as follows:—

Chart Showing Progress in 8 Years of 43 Children who were in the 1st Grade in the Year 1901. The Present Grades (1909) are Shown in the Chart.

20 Children Originally Bright.	9 Children Originally Fair.	4 Children Originally Dull.	
1			High School.
7			8A
3			8B
4	3		7A
	3		7B
1	1		6A
2		1	6B
2			5A
			5B
	2	3	4A

A certain small number of dull children improve remarkably and without apparent reason. Mr. Louis Nusbaum, Principal of the Horace Binney School of Philadelphia, cites two striking examples which are doubtless duplicated in the experience of many teachers. In one instance a boy 14 years of age had reached the fifth grade and attended it for one year. His work had never

been satisfactory and at the end of his year in the fifth grade he failed to win promotion, attaining an average of 63. He was, however, promoted as an experiment and worked along in the sixth grade for the next year in a slightly better fashion. At the end of this year he again failed of promotion but by a slight margin, his mark being 68. He was moved forward, without expectation of more than mediocre work, but his entrance into the seventh grade was marked by a remarkable change in this respect. One month later he led his class and continued a bright scholar, doing most satisfactory work until the end of his school career.

Even more remarkable was the second case, a boy who had remained in the fifth grade through five half-year terms under five different teachers, and who had come to be known in the school faculty by the appropriate name of "Shiftless." Promoted finally to the sixth grade as a venture, the same expansion of intelligence and remarkable improvement seen in the other boy just described took place in this one also. At the end of forty days in the grade (the middle of October), his teacher states that he ranks well up in the class and is rated excellent in spelling, good in arithmetic, language, and history, and fair in geography and physiology.

It would be interesting to know whether Hawthorne, Leigh Hunt, Sir Isaac Newton, Darwin, Froebel, Linnæus, Clive, and Wellington, who are reputed to have been dull boys in school, were dull only in the sense of mediocre students or in the sense of mentally deficient scholars (unable to do their school work in the regular time), and in either case it would be even more interesting to know the nature of the influences which subsequently caused such extraordinary development.

It is the impression of those whom I have asked for an opinion, and my own impression as well, that the most successful men are seldom the brightest boys in school. This may be a fallacious conclusion, for the "best scholar" is but one against the field and perhaps this is but natural. The general impression seems to be that precocious children are usually delicate and fail to develop the force which makes knowledge available in the affairs of life. The successful man, and I mean successful in science as well as in business, appears to combine a sound

physique, a mind which develops naturally rather than under school pressure, and environment which places him next to successful able men at the adolescent and post-adolescent period.

BORDER-LAND CASES.

Border-land cases ("backward children") are those so deficient intellectually that doubt exists whether to classify them as normal or feeble-minded. Psychologists usually judge them to be feeble-minded, but the ordinary observer does not (whether this difference in opinion is one arising from wisdom or from breadth of view is undecided). If peculiar traits due to ill-disciplined emotions also exist a diagnosis of slightly lower grade mentality is generally justified than when such peculiarities do not exist. Therefore, this group contains many children who would otherwise be classed only as very dull.

The reader should realize that the limit of the feeble-minded group is placed considerably higher by psychologists and eugenists than it is generally placed. On the other hand, legal officers are inclined to place the limit of feeble mind lower than it is usually placed. The tendency of the average justice of the peace is to dispose of his cases without thought of its existence unless the subject has become a pauper by reason of inability to make a living.

FEEBLE-MINDED CHILDREN.

Feeble-minded persons are those with incurable[1] mental deficiency of pronounced degree originating previous to adolescence,[2] the intellectual development varying from zero to a scholastic ability to do fourth-grade work after unlimited teaching. The maximum intelligence is stated by Goddard to correspond to that of a 12-year-old child. This is probably as good a measure as any that can be described briefly, the wide variation in different 12-year-old children and the existence of extra-intellectual evidence (bad heredity, cerebral paralysis, etc.) making an axiomatic definition impossible.

---

[1] Except in the case of cretins treated with thyroid extract.

[2] A normal adult losing his mind becomes *insane*. (Subvariety, dementia.)

At least two-thirds of the feeble-minded are degenerates, and in these corroborative evidence is usually furnished by a generally defective organism and a tendency to transmit the feeble-minded condition to the offspring. The fact that this class are *degenerates primarily,* and *feeble-minded secondarily,* should never be forgotten. The accidental cases also frequently present corroborative evidence of brain defect, such as the marks of head injuries, cerebral paralysis, and hydrocephalus. Lack of emotional control is quite characteristic of the feeble-minded. The following chart comprehensively presents the different grades of mental development:—

Classification of the Grades of Mental Development.

<table>
<tr><th colspan="2">Principal classification (on the basis of intellect).</th><th>Usually associated emotional condition.</th><th>Corresponding social classification.</th><th>Corresponding educational classification.</th></tr>
<tr><td>Feeble-minded</td><td>Idiots.
Imbecile.
High-grade feeble-minded.</td><td>Emotive.
Emotive.
Emotive.</td><td>Not able to support self.</td><td rowspan="2">Mentally deficient
(unable to do ordinary school work under favorable conditions).</td></tr>
<tr><td>Border land.</td><td>Backward-emotive.
Backward.</td><td>Emotive.
Not emotive.</td><td rowspan="2">Able to support self.</td></tr>
<tr><td>Not feeble-minded.</td><td>Dull.
Average normal.
Bright or precocious.</td><td>Not emotive.
Not emotive.
Not emotive.</td><td>Not mentally deficient.</td></tr>
</table>

Although he who is interested principally in school children may rest content with the simple diagnosis of feeble mind, the latter condition presents a great variety of types and grades. These, of course, are more or less capable of subclassification. Such subclassification may be on a basis of cause, by which we have degenerates, accidental cases, and of these still further sub-varieties. Again, it may be on a basis of type, whence we have the cretin, the mongolian, the hydrocephalic, the microcephalic, the cerebral paralytic cases, and others. Finally and of the most practical use is the classification based on the grade of mental development; and since such development is notoriously uneven in the feeble-minded, the subclassification of Barr, based on what the feeble-minded child can do, is the most practical.

Barr places lowest the IDIOT, who, at the best, can help only himself, and often cannot do even that; next the IMBECILE, who can do industrial and possibly manual work; last the HIGH-GRADE case, who is trainable not only in industrial and manual work, but can do some intellectual work also. What with the subdivisions of these groups, all recognizable as distinct grades by those in charge of institutions (the group limits are, of course, indistinct), the feeble-minded by Barr's classification (modified) may be divided into about seven grades:—

Idiot	*Low grade,* *Middle grade,* *High grade.*
Imbecile	*Low grade,* *Middle grade,* *High grade.*
High grade.	

Dr. Goddard, of Vineland, designates the highest group MORONS and subdivides them into low, middle, and high grade.

Special Types of Feeble-mindedness.

The classification by types was emphasized particularly by the older writers who were principally physicians in charge of institutions for the feeble-minded with more interest in anatomy and pathology than in pedagogy, psychology and economics. (It is noteworthy, however, that Barr, a physician, was the first to emphasize the practical advantages of a classification based on efficiency.)

The recognized types are nine or ten in number, only six being well known. Of these six three are primary and three are secondary (accidentally acquired). Taken altogether the cases presenting a definite type do not comprise more than about 15 per cent. of all the feeble-minded, the great majority of the latter possessing no other characteristics than the numerous physical defects and low nerve tone described later in connection with the evidence of mental deficiency.

The six well-known types may be described as follows:—

(*a*) OF PRIMARY ORIGIN.

1. *Cretinism.*—Cretinism is a condition caused by partial or total absence of the thyroid gland. In addition to his mental deficiency, the

cretin is very short in stature,—usually less than four feet. The head is large, the limbs short, the hands broad. The face has a characteristic appearance, the eyes being far apart and rather deep set, the nose broad and flattened, the lips thick, and the tongue large. The hair and skin are dry and coarse, the abdomen prominent, and the natural forward lumbar curve of the spine is much exaggerated. The basic characteristic is the *torpor* of both body and mind, the speech being slow, the thought slow, the pulse slow, and the temperature low.

The effect of thyroid extract upon cretins, especially in youth, is marvelous. It supplies the system with the one, but important, lacking element and remarkable physical and mental growth; sometimes complete cure results.

The interested reader should study in this connection not only cretinism, but the physiology and the different diseases of the thyroid gland, in order to understand a truly great subject.

2. *Mongolianism.*—The Mongolian type is much more common than the cretin, except in certain localities, notably Switzerland, and, in the United States, the basin of the Great Lakes. The cause is unknown, although the most tenable theory is vital exhaustion of one or both parents. Mongols are smaller in stature than normal children, and the nervous and muscular vigor is low. The vasomotor tone is so markedly poor that the hands, hanging by the side, are purple and swollen. The vital resistance is so low for this or other reason that the duration of life is short, most Mongols dying of tuberculosis, pneumonia, or other infection before the age of 35 years.

The diagnosis is made on the physical characteristics just mentioned plus the feeble-mindedness evidently existing (a five- or six- year mentality is almost a uniform maximum) and on the appearance of the face and head. The latter is absolutely sufficient in itself, the skull being round and short, the hair usually sandy, the eyelids obliquely set (whence the name Mongolian), the mouth always open, and the tongue large, with marked transverse fissures.

The Mongolian feeble-minded are uniformly of a happy disposition, the happy, silly smile combining with the oblique, half-closed eyelids and the open mouth to present the characteristic appearance.

3. *Microcephalus.*—This condition is said to definitely exist when the circumference of the cranium is not more than 17 inches—18 inches, according to some writers. The *shape* of the skull, however, should modify any judgment based on a skull of doubtful size, since microcephalus presents a typical, conical head due to imperfect development of the frontal and the occipital lobes. The stature is usually short—5 feet or less. The intellectual development may be of any grade of feeble-mindedness, but usually of low grade. A certain restlessness of movement is characteristic, and a corresponding animation presents either good-natured gibbering, mimicry, outbreaks of temper, or lively good nature according to the mental grade and the surrounding circumstances.

The cause is probably the usual one of degenerate ancestry, the small head found in the average feeble-minded being here excessively small because of some particular family trait. It is only because the cases with relative frequency occur in families that microcephalus is given the dignity of a distinct type.

(*b*) Of Secondary Origin.

Those cases of secondary origin are due to damage to the brain. Although we mention three types, they are not distinct from each other, either in causation, brain pathology, or clinical symptoms. The cerebral paralytic case may be possibly a localized meningitis with adjacent encephalitis; the hydrocephalic case is usually nothing more than a meningitis with a mechanical obstruction of the lymph circulation and consequent swelling of the head. Distinctive names are given to the hydrocephalic and to the cerebral paralytic cases simply because they possess accidental accompanying distinctive features—swollen head and motor paralysis, respectively.

4. *Cerebral Paralysis.*—This type has already been described (page 346) in the chapter on the nervous system. The feeble-mindedness and paralysis are frequently accompanied by epilepsy.

5. *Feeble-mindedness Due to Meningitis.*—Inflammation of the meninges (the coverings of the brain) may result from primary infection by the diplococcus, or from pneumonia, scarlet fever, or other infectious diseases. In such cases the underlying brain substance is likely to be damaged. If the inflammation occurs at the base of the brain, paralysis of the cranial nerves usually results; if the cortex is damaged, mental deficiency and possibly motor paralysis ensue.

Aside from those cases which produce a definite paralysis, and, therefore, are listed as a separate type, there are three clinical varieties of meningitic cases. In the first the cranial nerves are involved, and partial or total blindness, squint, facial or other paralysis occurs. In these cases the eye-grounds show characteristic changes. In the second variety there are no physical characteristics except possibly a slight weakness of the limbs, with exaggerated reflexes, but the disposition of the child is irritable. These feeble-minded are liable to outbursts of temper on slight provocation. The reason is probably an active congestion of the brain similar to that described on page 352. The third variety is one of the most remarkable, no physical signs being evident clinically and the children often good looking, amiable, and well dressed. As the ancestry is good, the condition is unaccountable until the history of meningitis in infancy is elicited.

6. *Hydrocephalus. Feeble-mindedness Due to Hydrocephalus.*—The term hydrocephalus denotes an accumulation of fluid in the brain, and this simple statement falls short of a scientific definition.

Normally the lymph circulation of the brain begins with its exudation from the choroid plexuses, thence soakage from the ventric-

ular cavities through the brain substance to the external surface, and finally removal from the subarachnoid space, either by the Pacchionian bodies in the cranium or the sheaths of the nerves leaving the spinal canal. It is plain meningitis may obstruct these exits, with consequent accumulation of fluid and intracranial pressure. This intracranial pressure, in turn, produces distention of the cranium, giving a large, globular head, thinning and water-logging of the brain wall, and from the latter feeble-mindedness may also result. The accumulation of fluid occasionally is *outside* the brain, and in such cases is usually a passive one, filling up a deficiency between a poorly developed brain and its skull wall.

It is evident that meningitis occurring before or shortly after birth is the variety which produces hydrocephalus, because the cranial bones are still soft and ununited. On the other hand, meningitis occurring after the bones have united cannot produce the typical condition, although many of the feeble-minded with normal-sized heads show suggestive watery accumulations in or around the brain. The average circumference of the hydrocephalic head is about 25 inches, the mentality being usually very low.

The distended, globular, hydrocephalic head differs from the square, rachitic head (see page 462), and also from the massive, hypertrophic head, the latter being due to a brain too large by reason of diffused connective tissue.

CAUSES OF MENTAL DEFICIENCY.

The general causes of mental deficiency are bad heredity, ill health, and improper environment.

Heredity in its strict sense is a transmitting influence existing in either the maternal or the paternal germ cell before their union creates the offspring. Such a definition excludes such influences as shock, injury, or disease of the expectant mother and classifies these as prenatal accidents to the individual himself.

We shall see that the most evident hereditary influence which produces feeble-mindedness is a degenerate (often feeble) ancestry. Epilepsy, alcoholism, tuberculosis, and syphilis are undoubtedly found, to a great extent, in the parents and grandparents of the feeble-minded, but the relation of cause and effect is disputed.

Ill health includes prenatal ill health of the child or of the expectant mother, injuries to the brain at the time of birth, injury to the head of a growing child, intoxication of the child's

system by infectious fevers, or alcohol, or retained body poisons in kidney disease, malnutrition, and heart disease. Some of the common physical defects of children, particularly adenoids, may lower the mental ability by lowering the general health.[1]

Improper environment signifies chiefly foreign parentage, illiteracy of parents, residence in the country or in an orphanage, bad companions, and poverty. Poverty, in turn, includes a number of factors, such as poor food and poor housing conditions, ignorant companions and neighbors.

Also under this heading must be included deprivation due to defects of the individual's senses. Blindness and deafness, total or partial, evidently put a person out of relation with his environment. It makes no difference whether failure to hear results from a noisy room or from defective hearing. In either case the child misses what is going on around him.

A. THE SPECIAL CAUSES OF FEEBLE-MINDEDNESS.

We have already learned that the three great causes of mental deficiency are heredity, ill health, and improper environment. Restricting the field to actual cases of feeble-mindedness, the first two are found to be the important and probably the sole causes.

1. Heredity.

This is the most powerful and frequent cause of actual feeble mind.

Probably over one-half of all the feeble-minded, and certainly three-fourths of all those found as State charges in our public institutions, are degenerates. They represent the running down of the human stock, and the poorly formed brain is paralleled by numerous defects of the other organs of the body. Since the brain is the dominant organ, we think of these degen-

[1] The frequently occurring physical defects of children (eye-strain, adenoids, defective hearing, decayed teeth, poor nutrition, and nervous exhaustion), *if causative of mental deficiency in an individual*, must act either through lowering the health or depriving the child of full knowledge of his environment. They may, therefore, be classed under both these causes. Defective sight, defective hearing, crippling deformities, and an oversensitive temperament distort or deaden the *environment*. Nervous exhaustion, poor nutrition, decayed teeth, nasal catarrh, and flat chest tend to *lower the health.*

erates as *feeble-minded* rather than as undersized or defective in heart, or limbs, or genital organs.

Degenerate Ancestry.

Degenerate parentage is by far the most powerful hereditary cause of feeble-mindedness. Degeneracy is evidenced most power-

Fig. 143.—Feeble-minded mother and feeble-minded child.

fully and most frequently by a defective mind, but we should remember that it is also characterized by a generally defective make-up, including defective bones, skin, circulatory system, *et cetera,* as well as the defective brain just mentioned.

Therefore, the rule of the eugenist "feeble mind produces feeble mind" is much better stated "degeneracy produces degeneracy." The latter expression is still more evidently

preferable when it is remembered that a healthy child who at the age of 6 or 7 years contracts scarlet fever with resulting feeble mind is certainly *not* a case of degeneracy and so far as we know will *not* produce feeble-minded offspring.

It may happen that the condition of feeble mind skips a generation, but in such case the fortunate one usually shows only fair health, and is often nervous, or peculiar, or is defective in some of his physical parts.

How potent a factor is degeneracy in producing mental deficiency is proven by the researches of Davenport, Goddard, and others. These researches have so far revealed no instance in which the children of two feeble-minded persons were not feeble-minded.

Examples of the Transmission of Feeble-mindedness.

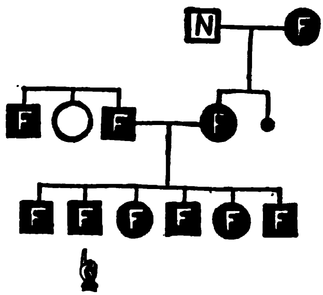
1. In the Bulletin,[1] "The Transmission of Feeble Mind," issued by the Philadelphia Department of Public Health and Charities is given the ancestry of 33 children in the New Jersey Training School for Feeble-minded Children. One hundred and ninety-four feeble-minded relations are distinctly mentioned, and an almost equal (combined) number of insane, alcoholic, criminal, and prostitute relations.

From this series of 33 cases 6 may be reproduced:—

Key to Chart.—Squares are males, circles are females. Inside letters denote condition of individual if investigator has been able to ascertain it. Small black circle indicates miscarriage. The *lowest* line has the brothers and sisters in the order of birth, reading from left to right. A child in the New Jersey Training School for Feeble-Minded Children is designated by the pointing hand.

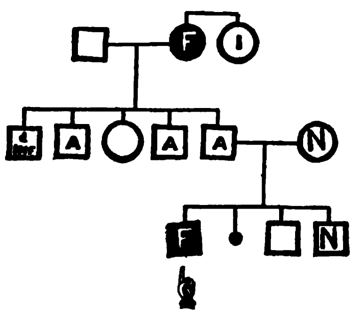
---

[1] A series of six bulletins, 1911, by Dr. Joseph S. Neff, Director, and Dr. Walter S. Cornell, Neurologist. These can be obtained on application to the Department.



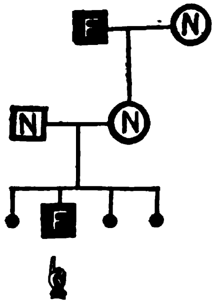
FEEBLE MIND IN THREE GENERATIONS (six in one family).

Case 1.—A feeble-minded woman married a normal man. A feeble-minded daughter and a miscarriage resulted. The feeble-minded daughter married a feeble-minded man who had a feeble-minded brother and a sister of whom nothing is known. The marriage of these two feeble-minded persons produced four feeble-minded boys and two feeble-minded girls.



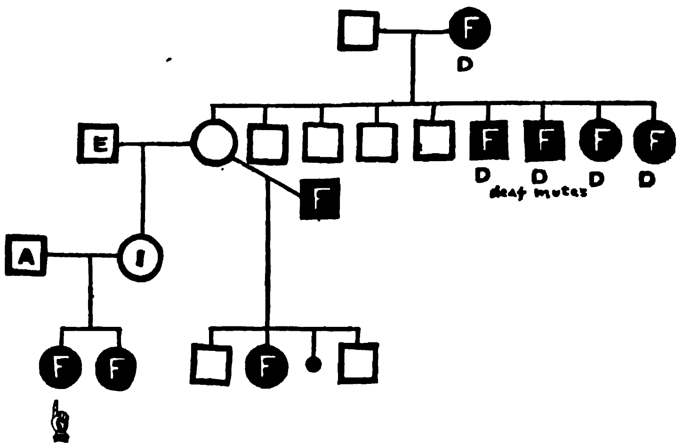
FEEBLE MIND REAPPEARING IN THE THIRD GENERATION.

Case 2.—A feeble-minded woman with an insane sister married a man of whom nothing is known. Five children resulted, a boy, dying in infancy, a girl of whom nothing is known, and the three boys who became alcoholics. One of these latter married a normal woman, who gave birth to one feeble-minded boy, a miscarriage, a boy whose characteristics are unknown, and a normal boy



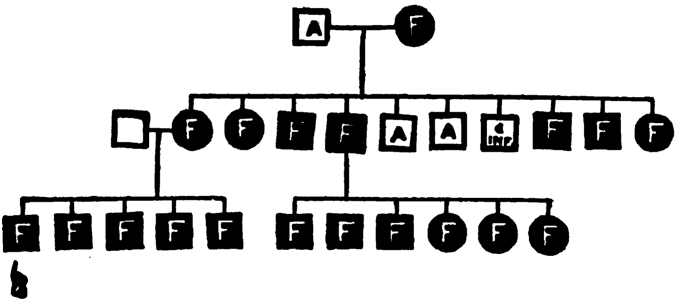
FEEBLE MIND REAPPEARING IN THE THIRD GENERATION.

Case 3.—A feeble-minded man married a normal woman. Their normal daughter married a normal man, but, nevertheless, gave birth to a feeble-minded boy and had three miscarriages—no normal children.



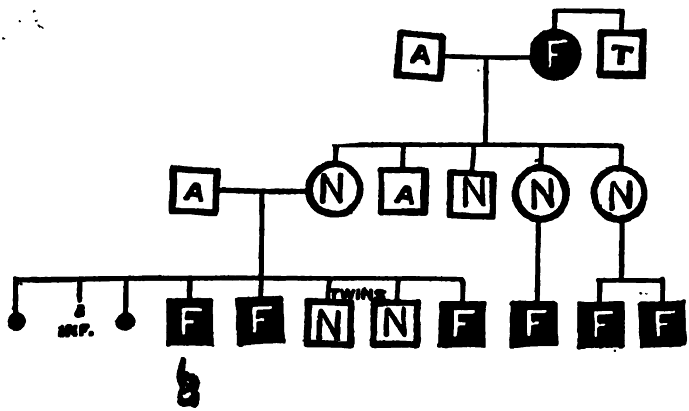
FOUR DEAF-MUTE CHILDREN (eight feeble-minded descendants).

Case 4.—A deaf, feeble-minded woman married a man of whom nothing is known. Their nine children included four deaf-mutes, four boys of whom nothing definite could be learned, and a girl whose characteristics are likewise unknown. She married an epileptic, and the insane daughter of this union, in company with an alcoholic husband, produced two feeble-minded daughters. The girl who married the epileptic afterward married a feeble-minded man. Their children comprised two boys, of whom nothing is known, a miscarriage, and a feeble-minded daughter.



EIGHTEEN FEEBLE-MINDED CHILDREN AND GRANDCHILDREN.

Case 5.—A feeble-minded woman married an alcoholic man. Seven of their children were feeble-minded, two were alcoholic, and one boy died in infancy. Two of the children (both feeble-minded) have children. All eleven were feeble-minded. (This chart is not constructed correctly. The six grandchildren had a mother of whom nothing is known—omitted on the chart to save space.)



SECOND GENERATION APPARENTLY NORMAL (six feeble-minded appear in the third generation).

Case 6.—A feeble-minded woman, possessing a tuberculous brother, married an alcoholic man. Result, three (apparently) normal girls, one normal boy, and one alcoholic son. One of the girls married an alcoholic man. Three feeble-minded sons, two normal sons (twins), two miscarriages, and a child dying in infancy resulted. The other two, apparently normal girls, each produced feeble offspring, one a boy, the other two boys.

2. In the Bulletin, "The Degenerate Children of Feeble-minded Women," it is stated that 20 feeble-minded women bore 60 children, of whom 8 were surely known to be feeble-minded, and 2 appeared to be normal. The mentality of the remainder is not definitely known, 21 having died in infancy, 19 being (living) infants or of unknown residence, and 6 being children suffering from epilepsy, or of incorrigible habits.

Fig. 144.—Feeble-minded family. Result of heredity.

3. In the report of the English Royal Commission to investigate the feeble-minded (1908), it is stated that in one district 165 destitute feeble-minded women were in almshouses or living as charity cases at home. Of these, 61 had borne children. The children (legitimate and illegitimate) numbered 158. Of the latter, 24 were feeble-minded, 22 were decidedly subnormal and delicate, and 19 appeared to be normal. The remaining 98 were dead or missing.

4. Family records illustrating the transmission of degeneracy are to be found by the hundred at institutions for the

feeble-minded, almshouses, and charitable organizations. The one instanced here is not extraordinary. It is a family handled by the Philadelphia Society for the Prevention of Cruelty to Children, and seen by the neurologist of the Department of Public Health and Charities coincidently with the publication of this bulletin. J. H., 358 T— Street. Father is an alcoholic laundryman. Mother is of high-grade feeble mind. She is childish, does not comprehend questions, and some time ago dressed one of her small children in a woman's old waist, with the sleeves sewed on backward. Of the children, Charles, 20 years old, is in the Institution for the Feeble-minded at Spring City; Frank, 16 years, has been committed to the House of Refuge for stealing; Clifford, 14 years, is feeble-minded and is in a special public school for backward children; Margaret, 8 years, and Walter, 6 years, are too deficient mentally to attend school; Lester, 4 years, is not yet able to talk, and has a bad case of bowlegs from rickets; baby, 18 months, is too young to give evidence of her mentality. It is a sad commentary on present conditions that the Society for the Prevention of Cruelty to Children and the Children's Bureau have been unable to do anything with this family, though it has been known to them for the last six years, during which time the three youngest children have appeared on the scene.

5. In the New Jersey Training School for the Feeble-minded are two girls whose families rival the famous Jukes family in their evidences of degeneracy. A searching investigation conducted by means of house visits throughout the State of New Jersey revealed that out of 930 members of one family 123 were normal, 87 died in infancy, and 176 were defective. The remainder were unknown.

The members of the other family are classified as follows:—

Feeble-minded	176
In institutions	27
Died before 2 years of age	87
Died before 7 years of age	17
Died between 7 and 21 years of age	14
Miscarriages	5
Illegitimate	62
Grave sexual offenders	40
Tubercular	19
Epileptic	8
Insane	12
Alcoholic	26
Killed by accidents	14

6. Barr, of Elwyn, has reported a case in which an imbecile of 38 married a delicate wife, and twenty years later was the father of 19 defective children.

Alcoholism, Epilepsy, Syphilis, and Tuberculosis.

Drunkards frequently produce feeble-minded children. Whether the drunkenness in the parent masks a condition of feeble mind, whether it represents a skipped generation in the feeble-minded chain in which a weak-willed exception took to drink, or whether the alcohol has poisoned the germ cells of a normal man or woman cannot be said positively. Probably all three. The cases reported have been mostly from pauper asylums. So far as I know, no investigation of heavy drinkers, *originally normal and of good stock,* with the object of determining the mental capacity of their children has ever been made. Such an investigation would be invaluable.

Epilepsy is sometimes seen in the feeble-minded, and consequently epilepsy is stated by many writers to be an hereditary cause of feeble mind. The disease signifies too many different disease conditions to be thus dealt with offhand. Epilepsy may arise from purely accidental causes. Since, however, epileptics *usually* come from neurotic families showing nervousness, chorea, sick headaches, hysteria, and not over-robust health, there is no doubt that the begetting of children by all the members of such families should be discouraged. The neurotic constitution is nature's warning that the limit of normality has been reached.

Syphilis has recently been brought forward as a hereditary cause of feeble-mindedness. Previously the influence of this venereal disease had been minimized by investigators. The Wassermann reaction (a delicate biochemical blood-test) has demonstrated that among the feeble-minded found in public institutions (these are mostly paupers and of the degenerate type) hereditary syphilis exists in possibly one-fifth of the cases examined.[1] The significance of these findings is yet undetermined. It illustrates, however, that hidden faults may

1 See Noguchi's book; also the work of Drs. White and Ludlum, University of Pennsylvania, and McCord and Cornell, New Jersey Training School and University of Pennsylvania.

possibly be just as active as public ones, and that the diagnosis of the cause is not always easy.

Tuberculosis of the parent has, for years, been mentioned as a probable hereditary cause of feeble mind. This for the reason that tuberculosis is a chronic wasting disease destroying the parental vitality by slow poisoning, and for the further reason that a large proportion of the feeble-minded (25 to 30 per cent.) possess tuberculous parents. In Barr's "Mental Defectives" is given tables compiled from the cases of the Royal Albert and Darenth Asylums. The proportion of the feeble-minded children (these were public charges from a low social class) possessing a consumptive ancestry was 28.3 per cent. Here, again, we must reason as we have in the case of the suggested alcoholic influence. Are these parents tuberculous because they are themselves degenerate and of low vital resistance, or are they tuberculous simply because they come from the poor class, with its insanitary conditions and generally high tuberculosis death rate, or does the tuberculosis really poison and degenerate the germ cell of the parent before the child is conceived?

All these hereditary influences which have just been discussed as causative of feeble-mindedness can, of course, produce the minor degrees of mental deficiency and frequently do so.

2. Ill Health.

Prenatal Ill Health.

Injury, infectious disease, kidney disease, fright, or emotional shock affecting the expectant mother may produce a mentally deficient child. Among the diseases particularly credited with this influence are tuberculosis and alcoholism. The possibility of their action has just been discussed in connection with heredity. Concerning the influence of shock, fright, famine, war, and pestilence, Barr, in his book, gives statistical evidence and cites different instances of such cause and effect. While recent social and medical research have shown that the "maternal shock" factor is of minor importance, we believe that such cases do occur. There are too many recorded cases of fetal *death* after maternal shock to permit denial of fetal *injury*. Hydrocephalus originating before the time of birth usually produces mental deficiency.

Deficient Secretion of the Thyroid Gland.

Deficient secretion of the thyroid gland produces mental deficiency and faults of growth, secretion, and nutrition. Marked thyroid deficiency produces cretinism (*q.v.*), with its accompanying low-grade feeble mind. Possibly the pituitary secretion has an analogous action. Mongolianism appears to be a type corresponding to cretinism.

Injuries at Time of Birth.

Injuries of the head at time of birth, usually by forceps compression, sometimes by strangulation, produce an unknown number of mental deficients. There may be marked physical evidence of the injury, particularly cerebral paralysis (see page 346) or a misshapen skull. In other cases there is no paralysis, and, owing to the softness of the cranial bones at time of birth, the skull shows no markings. When one considers that a very difficult labor gives a fair chance of either a dead or a feeble-minded infant the great number of the latter is realized. How many of the simply dull and backward school children arise from this cause cannot be determined.

Ill Health of the Growing Child.

Injury of the brain of a growing child may stop the mental development. Principal among this group of causes are meningitis (occurring either as a primary disease or secondary to scarlet fever or pneumonia), cerebral paralysis of childhood (see page 346), and accidents to the head from falls and blows. Since almost every child falls and bumps its head several times, parents of feeble-minded children are likely to ascribe the condition to such an event.

Malnutrition is a cause of mental deficiency varying, according to the degree of starvation, from dullness down to a condition which in infants simulates imbecility. This cause is discussed later (causes of feeble mind, and causes of dullness).

Heart disease of pronounced degree and *kidney disease* are among the rarer causes of mental deficiency. I have personally seen four or five feeble-minded children with an extreme

degree of valvular leakage, blue face, clubbed nails, and feeble mind. In these the conclusion is almost forced that the brain has failed of nourishment, or that the abnormal blood-pressure has produced brain deterioration. Poorly developed hearts, functioning fairly, are often met with among the dull, backward, and feeble-minded. In many cases they are doubtless simply associated defects indicative of degeneracy. In others they are accidental. In a few they are vestiges of early scarlet fever or other infectious diseases which ruined the heart and brain alike.

As to kidney disease which acts by poisoning the system because excrementitious substances are retained, there is plenty of evidence that it may cause insanity, but the production of mental deficiency is rare because most cases of chronic nephritis occur in adult life. Hamill, however, has reported a case (*Proceedings Philadelphia Pediatric Society,* November 13, 1900) of a boy who suffered from chronic parenchymatous nephritis following diphtheria, and was four years behind in his school class. An Edebohl operation was performed with subsequent great improvement in the general health and mentality. The teachers remarked on the latter and since operation the boy has been promoted regularly.

Accidental cases constitute no disgrace, although a great misfortune. They may occur in any family.

Cases of Mixed Origin.

Occasionally are seen "mixed" cases: (*a*) those degenerate children, originally feeble-minded, who have also suffered head injury by reason of meningitis, or epileptic convulsions, or other brain damage; (*b*) those degenerate children with brains and skulls so peculiarly formed that the examiner wrongfully supposes that they are of the truly mixed class just described, and (*c*) those in which a "normal" child of a feeble-minded parent becomes feeble-minded after sickness or head injury. In this case the diagnosis is again likely to be wrong, since the seeds of degeneracy are really already present in a case of apparently purely accidental origin.

Because of the preponderance of degeneracy cases, and the possibility of apparently accidental cases being really "mixed"

cases, *the only safe general plan of social procedure is to regard all cases of feeble mind as capable of producing feeble-minded children.*

3. Improper Environment.

The power of unsuitable environment to produce feeble-mindedness is doubtful. In previous generations legends existed of wild men in forests reared by wild animals and resembling brutes more than men. A list of 11 such cases is given by an early French writer, Bonaterre, covering all those real or imaginary known in Europe during the eighteenth century. The last one of this series, "the Savage of the Aveyron," was brought to Paris about the year 1800 and proved the starting point of modern scientific interest in the great subject of mental deficiency. Whether these persons were apocryphal or real, and whether they were originally feeble-minded or not, is a matter of speculation. In these civilized days the museum "wild man" sheds his hairy coat after the performance and goes home to supper.

Of course a feeble-minded child may be affected considerably for better or worse by his environment just as any other child may be so affected. By appearances more so, for the neglected feeble-minded child is a helpless, repulsive object.

B. SPECIAL CAUSES OF DULLNESS AND BACKWARDNESS.

Although without proof of the assertion, it appears that an improper environment is the most frequent of the causes of dullness. Ill health and heredity act quite frequently, however.

1. Heredity and Dullness.

In the case of the actual feeble-minded, the influence of a degenerate ancestry is easily demonstrated, but in the case of dull children of dull parents the relationship of cause and effect is difficult to prove. Such children so frequently live in poverty, with poor health and poor environment, that it seems unnecessary to call upon heredity for explanation of the condition. Nevertheless, it is reasonable to suppose that a second-rate hered-

ity (not degenerate) is comparable to that of a cheap animal or fowl as contrasted with thoroughbred stock.

The city poor, the idle rich, and the inhabitant of certain back country districts probably furnish an undue proportion of such cases. It is significant that most of our leaders who have risen from early poverty have been country boys rather than city boys. Country poverty signifies little, but city poverty is often an expression of inability and inequality. The idle rich contribute cases not because they are rich, but because they are idle. In isolated rural communities the inhabitants of which have intermarried for generations, losing the stronger strains by emigration and perpetuating the weaker ones, an inferior stock results. The poor mountain whites of North Carolina are the best known examples of this slow degeneracy, but similar conditions are found in Vermont, Massachusetts, and New York.

Those cases due to heredity are naturally the most difficult to improve.

The lower the inherent capabilities, the nearer do we approach the condition of feeble-mindedness. Therefore, borderland (backward) cases possess a poor heredity in much greater proportion than do the simply dull. As we shall see, however, this unfortunate group seems to possess pretty much of everything—second-rate ancestry, poor environment, poor health, and numerous physical defects.

Race is a factor which influences the mental development. It is conceded that the negro has not the same average capability as the Caucasian, although there are, of course, numerous exceptions in each race. There is a definite idea among educators that the negro child develops at the Caucasian rate until the fifth grade is reached, after which the attainment of the maximum brings about a steady dropping out until few go through the high school and almost none are graduated from college. The negro colleges are not of the same standard as the white colleges, their grade being high school or academic. In my own experience as a teacher of anatomy in the Medical School of the University of Pennsylvania, handling hundreds of medical students, I can recall no negro student who was remarkable and but three or four who were good students. This poor showing cannot be blamed on poverty and home conditions, for the

Russian-Jewish students, children of immigrants, who are poorer, and hungrier, and dirtier than the negro students, usually finish at or near the top of the list.

Here is reprinted from an article by Dr. Roland P. Falkner, in the *Psychological Clinic,* April 15, 1910, the age-per-grade figures of the white children and of the colored children of Memphis, Tennessee. I do not know the exact significance of these figures, but they are interesting as facts. On the one hand, it may be noticed that the colored children are from one to two years behind the whites; on the other, that they start out at least one and one-half years behind and end only a year behind. There are a number of obscure points. Thus, the average figures for the United States, also given in the table below, show all the Memphis children to be of low standard. Is this due to local conditions, or to conditions in the South generally? What percentage of the colored children (or of the white children) drop out of school and so relieve their race of the worst-showing members?

	Ages of Children.		
	Memphis, Tenn.		United States
Grade	White	Colored	
1	7	8.5	6
2	8	10.9	7.6
3	9.9	11.6	9
4	11.1	12.8	10
5	12.1	13.7	11
6	12.9	14	12
7	13.7	14.8	13
8	14.5	15.5	14

2. Ill Health and Dull Mentality.

Ill health in a general sense signifies malnutrition, but the local defects seen so frequently in children by medical inspectors and classed loosely as "physical defects" may also be studied as a group in connection with this subject.

Concerning malnutrition, its result upon the mentality depends upon its degree. Because in starvation the heart and the nervous system hold out best among the wasting tissues, the life-pump continues and the mind acts clearly when the end is fast approaching. For this reason malnutrition does not produce

dementia. Inanition occurring in a 3-year-old infant, however, may hold back the mental development for a year or two and give rise to a condition absolutely not to be distinguished from imbecility. In children of school age, half-fed, a condition of lethargy results which makes intellectual work almost an impossibility. It is for this reason that the proposition has been made

Fig. 145.—Backward mentality due to poor nutrition and environment. Father of the older boy is an Italian earning $4 per week.

to give all children a glassful of milk and a piece of bread and butter and sugar—to enliven and sweeten the words of the teacher, so to speak. The results of the Bradford school lunches (page 108) and the McCormick Open-air School (page 128) may be reviewed in this connection, not forgetting that there are fresh-air enthusiasts who claim that fresh air alone will accomplish perfect health.

Before taking up the influence of physical defects upon the mentality of children or, to state it more correctly, the *association* of numerous physical defects with dull mentality, we may first review the demonstrated connection of eye-strain (page 223), of adenoids (page 273), of defective hearing (page 302).

Learning therefrom that some, at least, of the common

Fig. 146.—Eye-strain in dull children. Of 174 dull children, 68 needed glasses. (About 50 in picture.)

physical defects retard the child, the findings after examination of (*a*) dull children and (*b*) backward children are interesting. The former is given in detail in Chart No. 7 in the chapter on the Prevalence of Defects, portraying the condition of 174 dull children in the William McKinley School. Reference to this chart shows eye-strain in 39.4 per cent., adenoids in 23 per cent., malnutrition in 12.6 per cent., of the pupils.

Altogether 188 physical defects necessitating parents' notices were found in 116 children. Twenty-five children possessed

defects of minor degree not necessitating parents' notices. Only 33 passed muster with a clean physical record.

Passing to backward children, the number and degree of physical defects are even greater than in the case of the dull children. In the Wharton School, Philadelphia, in the class for backward children conducted by Miss Maguire and taught by Miss Devereux, the physical examination of the children revealed that of the 22 children 11 possessed defective vision (three-fourths or less), 14 possessed adenoids in marked degree, 5 were markedly deaf or suffered from discharging ears, and 7 were very poorly nourished.[1]

A miscellaneous lot of backward and feeble-minded children was made the subject of special investigation two or three years ago by the writer. These children were in the poor foreign quarter of the city, scattered through several schools, and represented the worst class of the mental deficients. A picture of their home surroundings, portrayed by the school nurses, has just been given. There were 44 children in the group.

Of the 44 children examined but 3 passed without noticeable physical defect recorded against them. Of these 3, 1 was so backward mentally that attempts at physical examination as to the eyesight and hearing were useless. There were 12 cases of defective vision known to exist in addition to doubtful cases where the feeble mentality of the children precluded any decision. Thirty-one cases of nose and throat defect were recorded, as well as 9 cases of discharging ears. The nutrition was found very poor in 27 cases. Sixteen of the children were nervous. Taking the major physical defects of defective eyesight, nose and throat defects, deafness, discharging ears, and nervousness, the multiplicity of defects in many of the children was remarkable. Thus, 7 children possessed four of these five major defects just noted, while 11 children possessed three defects of a possible five. It may finally be remarked in connection with these children that their home surroundings in 9 instances were absolutely improper, and the family or personal medical history of 13 was sufficient to reasonably account for the mental defect existing.

[1] "Mentally Defective Children in the Public Schools," in The Psychological Clinic.

Here is presented the report of Miss Anna L. Stanley, head school nurse of Philadelphia, on the previous health of a number of very dull and backward children in the poor foreign quarter of that city. These children had been previously examined by the writer and were such forlorn objects that an inquiry looking to their betterment was instituted. The details were gathered by the assistant nurses:—

Chas. Leondo, 1036 R—— St.—Very illiterate parents. Poor home. A sickly child having much intestinal trouble up to 7 years of age. Another child in family who seems to lack animation.

Rosie Jahs, 341 M—— St.—Hungarian parentage, mother dead; history obtained from sister, who says Rosa was very small when a baby. At the age of 1 year was no larger than a beer bottle, did not walk until 3½ years of age. Always studies her lessons at home and is doing well in school because she was promoted in June.

Israel Wagner, 219 C—— St.—Mother says boy is just 8 years old now, of Roumanian parents. Israel had a nose and throat operation this spring and mother thinks he is greatly improved. Attributes his backwardness to a long-standing nose and throat condition.

Sarah Altowitch, 927 S. S—— St.—Mother very intelligent, claims Sarah is very disobedient and backward, does not like to go to school, but likes sewing and knitting. Always dirty. Mother cannot instill clean habits, does not know what to do with her.

Joseph Rufkin, 904 M—— Ave., moved to 307 S. T—— St., and transferred to Geo. M. Wharton School.—Joseph has been in America only two years; mother says he cannot see the blackboard and thinks that is the cause of his stupidity. Complains of headache often.

Gertie Altman, sister to Joseph.—Could not talk at all until 7 years of age, and since, indistinctly. Under care of family physician for swollen glands in neck.

Joseph Ovatoshy, 944 S. F—— St.—Mother died quite young when Joseph was 12 days old; confinement hard, but normal; child raised on bottle. Joseph is an only child and has always worried father because of his "foolish ways"; child's mother was very foolish also, but he did not notice it until after they were married. Father says he has taken the boy to several physicians, who have told him nothing could be done for him.

Fred Smith, 2301 N. L—— St.—Mother attributes child's dullness to spasms, which appeared at the age of 15 months and continued until he was 8 years old, but has not been afflicted since. Was told by the midwife that he was a seven months' baby owing to the fact that there were no finger-nails. Could put him in a cigar box. Had scarlet fever at the age of 9. House appeared fairly clean, but the children and mother were very dirty.

Joseph Murphy, 2118 N. L—— St.—Mother said the cause of the boy's backwardness was due to his having had cholera infantum at 6 months, and also at the same time she used some medicine prescribed by the family physician for his sore eyes, and the first application blinded him in one eye. House very clean and mother also.

Morris Shetz, 722 S—— Ave.—Very delicate when an infant. During home hours is very obedient and goes to bed at 9 o'clock. Always had trouble to breathe through nose, sleeps with mouth open. Makes no effort to study at home.

Antonia Carfagne, 1129 S. A—— St.—Parents do not realize that child is backward. Had pneumonia at the age of 5 years. One older brother in family who has never talked and never been to school.

Antonio Fratanduono, 1006 S. N—— St.—Parents know of no reason for child's lack of progress in school, except that he dislikes to go. Weak and sickly after 3 years of age. Sores (from description, of pustular nature) on head for a year, which necessitated opening from time to time. Good home. Heavy meat eater last few years.

NOTE. Family History.—Father has syphilis. Father's mother and nephew are feeble-minded. This boy has had typhoid fever, malaria, pneumonia, measles, scarlet fever, diphtheria, and kidney trouble.

Sol Rubin, 1114 M—— Ave.—Mother claims child will not be 8 years old until October 20, 1908. Very hard labor with instruments. Mother says he is a good boy, but knows nothing of his school work. This boy has prominent, bulging forehead; poor nutrition, pot-belly, catarrh, and rickets, in addition to nasal obstruction and slightly defective vision.

If the scholarship of the entire group of children suffering from eye-strain, adenoids, defective hearing, and poor nutrition be compared with that of healthy children, it will be found to be distinctly lower. Such impersonal statistics are not as scientifically conclusive (as to cause and effect) as are the studies on the effects of these defects taken separately, which have been already mentioned; but they do demonstrate an important general condition which furnishes the most powerful argument for medical inspection.

In 1908 I published a booklet "Backward Children in the Public Schools," giving the results of my studies in this field. The defects there considered were those just mentioned plus a few cases of multiple dental decay. They were serious enough to warrant in every case a notice to the parents. From this booklet may be quoted:—

"The children studied were those of three Philadelphia schools who had been previously physically examined by myself in conjunction with the official work of medical inspection.

"The first step was the recording, in each school, of the name, physical record, and scholarship of each child. The latter was obtained by using the previous term-marks in three of the school studies, from which an average mark was easily calculated.

"The average term-mark of the whole school was first obtained by the simple process of adding the term-marks of all the children together, and dividing by the number of children. For instance, in the Claghorn School this was 73.1.

"The record cards of the children were then divided into two collections: one of the healthy or normal children, the other of the general group showing some noteworthy physical defect. The average term-mark (the scholarship index) was then calculated for each group separately, and the two compared, first with each other, and then with the term-mark of all the children previously calculated.

"The results showed that in each school, *and in each individual branch of study in each school,* the healthy or normal children stood higher in their classes than the average children, and the physical defectives, taken as a class, stood lower than the average children.

ALLISON SCHOOL—219 CHILDREN, BOTH SEXES, 6 TO 12 YEARS OLD.

	Average
Normal child	75
Average child	74
General defectives	72.6
Adenoids and enlarged tonsils	72
Deaf	67.2

NINTH STREET PRIMARY SCHOOL—84 CHILDREN, BOTH SEXES, 6 TO 10 YEARS OLD.

	Language	Arithmetic	Spelling	Average
63 cases normal children	72.9	75.5	75.4	74.6
84 cases average child	70.5	74	72.8	72.4
21 cases general defectives	63.3	70	64.8	66
8 cases adenoids	60	66.7	65	63.9
No cases deaf.				

CLAGHORN SCHOOL—252 CHILDREN, BOTH SEXES, 12 TO 15 YEARS OLD.

	Language	Arithmetic	Geography and History	Average
179 cases normal children	74.4	72	76.6	74.3
252 cases average child	72.7	70	76.5	73.1
73 cases general defectives	71.4	65.1	76.2	70.8

"An investigation on slightly different lines was afforded by the existence in the Claghorn School of four classes of the same grammar grade, which had been so made up at the beginning of the year that the brighter children constituted two classes, and the duller children the other two classes. The latter were smaller, so as to afford more opportunity for individual instruction. A comparison of the physical condition of the children is interesting and instructive:—

	Bright Children Class 1	Bright Children Class 15	Dull Children Class 9	Dullest Children Class 11
Number of children	50	39	32	29
Proportion of normal to defective children:—				
Normal	36	32	20	13
Defective	14	7	12	16
Percentage of normal children	72%	82%	62.5%	44.8%

"In June, 1906, the school medical inspection corps of Philadelphia was directed by its chief, Dr. Thomas J. Beatty, to make a comparative study of those bright children exempted from their annual examinations, and those children whose lower scholastic standard necessitated their examination for promotion. The proportion of physical defects recorded in the two groups was made the basis of comparison. I am indebted to Dr. Beatty for permission to publish the figures which I submitted to him at that time. It will be observed that, on averaging the five schools, the brighter children showed the less percentage of physical defect.

	Exempt Children Normal	Exempt Children Defective	Non-exempt Children Normal	Non-exempt Children Defective
Ninth St. Primary School	56	28	39	38
Rutledge School	87	35	75	34
Allison School	128	65	81	49
Camac School	183	71	103	75
Claghorn School	193	61	127	66
	647	260	425	262
	Percentage defective, 28.8 per cent.		Percentage defective, 38.1 per cent."	

The analysis of the physical condition of dull children, average children, and bright children which was made in 1909 by Dr. Leonard P. Ayres, of the Russell Sage Foundation, is very valuable. This was published in the *Psychological Clinic*, May 15, 1909, and afterward in Dr. Ayres's book "Laggards in Our Schools." The records of 3304 New York City school children between 10 and 14 years of age, previously examined by the medical inspectors, were analyzed. On the basis of age-per-grade Dr. Ayres divided the children into three groups, "dull," "normal," and "bright." His results were as follows:—

	Dull	Normal	Bright
Number of children examined	407	2588	309
	Per cent.	Per cent.	Per cent.
Percentage of children defective	*75*	*73*	*68*
Defects per child	1.65	1.30	1.07
Percentage of children showing:—			
Enlarged glands	*20*	*13*	*6*
Defective vision	*24*	*25*	*29*
Defective breathing	*15*	*11*	*9*
Defective teeth	*42*	*40*	*34*
Hypertrophied tonsils	*26*	*19*	*12*
Adenoids	*15*	*10*	*6*
Other defects	*21*	*11*	*11*

These figures require some knowledge of physiology for their proper interpretation. These children were 10 to 14 years of age. *At the age of 10* small adenoids have shrunk so that they are not as noticeable as formerly and sometimes have practically disappeared. The last temporary tooth has just been lost, and the oldest tooth in the mouth (the six-year molar) has been erupted only four years, so that the best dental conditions are found. Vision which decreases in acuity progressively with age in all except the myopic (and almost no young children are myopic) is at no particularly critical period.

The imperfections in the above table are due to the omission of important data by the original examiners. The eye-strain cases are all lumped together, although vision of three-fourths or over does not much inconvenience a child, while vision less than one-half constitutes an obstacle to seeing the blackboard. "Defective breathing" and "adenoids" are mentioned separately, although they are really practically synonymous in the case of young children. Poor nutrition, which produces marked lowering of mental activity, is not mentioned at all.

The items on the above list may be interpreted most satisfactorily thus:—

1. Adenoids, enlarged tonsils, and "defective nasal breathing" exist in greater proportion among the dull children because these defects frequently cause mental deficiency. (See pp. 274-281 and 302.)

2. The greater proportion of decayed teeth among the dull children may mean any one of three things: (*a*) The difference is physiological and simply due to the fact that the dull children of Dr. Ayres's series averaged 13 years in age, while the bright children averaged only 10 or 11 years. That children of 10 possess better teeth than children of 14 has just been pointed out in the preceding paragraph. (*b*) The difference may be due to social influence, that is, the dull children come from the poorer and more ignorant homes. (*c*) The difference may be due to some depressing influence of dental decay on the general health and mentality. Proof that *children* suffering from one, or two, or three decayed teeth, taken as a class, suffer from lowered health is so far lacking (see pp. 312, 313), although there is abundant evidence that mouth sepsis can cause the most grave debility in adults, and it is reasonable that a great many decayed teeth in one mouth must affect its possessor deleteriously. The comparative immunity of children is probably due to their normal acid germicidal gastric juice, which kills the germs coming into the stomach from the mouth.

I am inclined to look upon (*a*) as the principal cause of the different dental conditions shown by the different groups of children.

3. The greater proportion of enlarged glands among the dull children is due to the fact that these are the children showing the more cases of enlarged tonsils, adenoids, and decayed teeth. These latter defects are almost the sole causes of enlarged glands. In other words the enlarged glands themselves l ave no relation to the scholarship.

4. Defective vision existing in somewhat greater proportion among the brighter children cannot be explained readily, but the following facts already known may serve to explain somewhat this unexpected finding. First, the figures in question are lump figures taking no account of the degree of the visual defect, so that the children with slightly defective vision are classed with those with very defective vision. We know that slightly defective vision (say, three-fourths by the test card) does not bother a child, except when studying for a half-hour or more at night, so that from a practical standpoint it is a question whether the grouping was well done. Second, the London Report (see pp. 226, 227) shows the remarkable fact that the very brightest children possess worse vision than the bright average children. Third, it is well known (see p. 582) that the children of the educated class show degenerated (myopic) eyes more than do those of the uneducated, laboring class. A fourth factor, the decrease in accommodation with age, is negligible in a limited period of four years.

3. Poor Environment and Dull Mentality.

Poor environment causes poor mental development, partly from lack of stimulus and partly from the unhygienic conditions which so often accompany poverty. The child of the ignorant laborer does not develop as does the child of the intelligent, well-to-do professional man.

The home conditions of these children, as gathered by the school nurses from the mothers, is interesting. Some of the more striking cases may be quoted:—

Tony Buondono, 514 M—— St.—Extreme poverty, father unable to work for a long time on account of wound of hand. Both parents illiterate. Six children. They are often obliged to remain away from school on account of lack of clothing.

Fred Le Basco, 602 K—— St.—Likes to go to school, but stubborn and wayward at home. Goes to bed late. Ignorant parents. Diphtheria and scarlet fever at seven years, unable to talk for a long time afterward.

Carmella Raspa, 1128 H—— St., Michael Raspa (brother).—Illiterate parents. Poverty and dirt. Two brothers in same condition. Parents densely ignorant. Home life rough.

Nicholas Capasso, 735 A—— St.—Father unable to account for slow progress in school. Very disobedient, goes to bed late, will not study at home. Treated at Pennsylvania Hospital for catarrh.

Elizabeth Cylinder, 1221 S. S—— St.—Parents too ignorant to recognize child's backwardness. Sick at 2 years of age with intestinal trouble. Father objects to one session.

Frank Erwin, 2346 N. F—— St.—Mother was very reticent and appeared somewhat suspicious of the nurse's visit. Said the boy was doing all right in school as far as she knew. Never sick, eats and sleeps well. Signs of poverty, father cripple. Stated that she could not look after the boy well because of a sore leg, which hurts her to stand on her feet. An exceedingly large woman, face very red and of a swollen appearance.

May Cantrell, 2309 R—— St.—Mother does not consider child backward, says she has had but one full school year in the four years of her school life. Has had scarlet fever, diphtheria, measles, and neuralgia of the face since she was 6 years old, and these have necessitated long absence from school. Says the child is anxious to go, but does not like study. Often whips her because she will not get her lessons. Poverty and dirt much in evidence. Prefers child to go to parochial school because she thinks the Sisters have more patience.

Miriam Jaratosky, 1105 S. T—— St.—Mother appears dull and stupid, says as far as she knows child does all right in school.

Max Lehrman, 534 S—— St.—Mother appears very stupid. Insanitary home conditions. Unable to get history.

Abraham Brooks, 267 F—— St.—Home and surroundings very dirty. Parents indifferent to boy's progress in school. No trace of illness, except nasal obstruction, which is being treated by family physician.

Among the truant boys of the special schools and the delinquents held for court at the House of Detention the environmental conditions are found to be bad in a large majority of the cases. Without digressing into sociology we feel it apropos of the subject of mental deficiency (for such boys are almost all mentally deficient; see page 436) to state that the average delinquent child comes from a poor home, a house of five rooms, a family of five children, a parents' ability to "read and write," and a father with an irregular home-absenting or laboring occupation, while parents with vicious habits are quite numerous.[1]

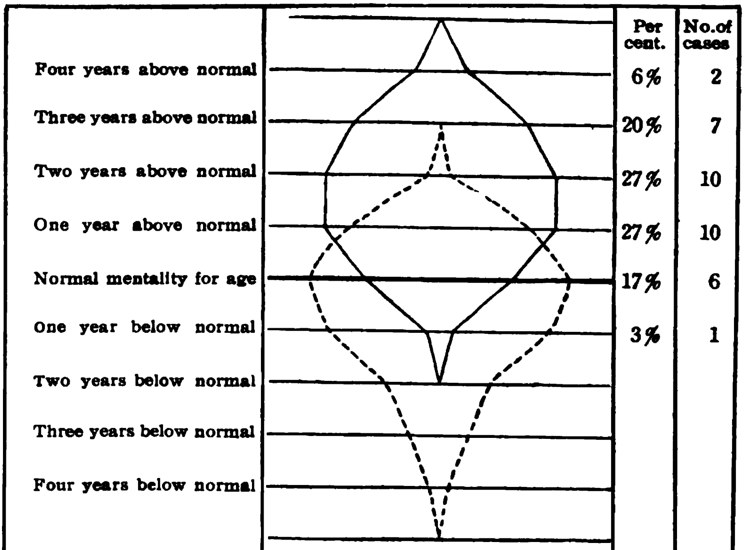
The child raised in an orphanage makes a very mediocre getaway in life's race, although no doubt better than he would otherwise make. I have had referred to me children from small orphanages who were hastily judged feeble-minded by their adopters, because they did not know the simplest things about civilized community life. I remember one 12-year-old girl who did not recognize a quarter-dollar when it was shown to her because the only money she was acquainted with was imitation orphanage money. This girl did not know the streets in the neighborhood of the orphanage. She was simple-minded rather than feeble-minded, reminding one of the patient, simple, happy children raised in a blind asylum. At the time of her examination a companion girl from the same institution presented a lack of development almost as marked.

A remarkable case once seen was that of a small boy from the neighborhood of Lancaster, Pennsylvania. He was poorly developed mentally, and his speech was unintelligible, except to his mother and grandmother. Inquiry developed the fact that

[1] An investigation of delinquent boys by the writer, Miss Mollie A. Woods, Principal of Philadelphia Special School No. 6, and Mr. J. Prentice Murphy, Superintendent of the Philadelphia Children's Bureau, is now in preparation for publication. The mentality of these boys is mentioned on page 436, and their physical condition on page 576.

he had been living with these two women in an isolated country district, with no other companion than a deaf-mute and a small Polish boy recently immigrated. The women were provincial and rather ignorant, and the boy's mental and speech condition was an environmental result.

On the other hand, the child reared in an atmosphere of culture and refinement is far above the average mentality for his age, just as the unfortunate child is below it. This is strikingly shown by the results of an examination of 36 children in the School of Observation and Practice connected with the Philadelphia Girls' Normal School. These children were tested with the Binet tests by Miss Grace Hamill, who had previously assisted in the examination of the mentally deficient boys in the House of Detention. The latter fact relieves Miss Hamill of the suspicion of bias or ignorance in conducting the tests.



The mental development is shown by the solid black line. The dotted line represents the mental development of average school children. (See Figs. 152 and 157.)

Fig. 147.—Results of examination by Binet tests of 36 children in 2 B Grade, Philadelphia School of Observation and Practice. (January, 1911, Miss Grace Hamill.) Showing high mental development because of good home environment.

The children in this school are far above the average socially, the school being looked upon as a select place for the children of well-to-do people. Miss Hamill's examination as given below in the chart and table shows that the children in some instances are three and four years above average children in their mentality. The chart here shown should be compared with the charts (Figs. 152 and 157), which show, respectively, the mentality of average children and of delinquent boys.

Mental Age by Binet Test.

		7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.	
Actual age	7 yrs.			4	1	2	7
	8 yrs.		1	8	6	6	21
	9 yrs.		1	5	2		8

Summary.

4 years above normal	2 or 6%
8 years above normal	7 or 20%
2 years above normal	10 or 27%
1 year above normal	10 or 27%
Normal	6 or 17%
1 year below normal	1 or 3%

Incidentally and without detracting from the value of the Binet test as a means of eliciting *evidence* of the mental development, this chart shows the fallacy of attempting to make a *diagnosis* by hard and fast rules based on intellectual attainment alone.

A most remarkable case was that of a Russian Jewish girl, who at the age of 5 had been termed feeble-minded by an orphanage attendant. Upon subsequent placement three years later in a private family the principal of a neighboring school refused her admission because this statement was repeated to him. After two years had elapsed an older brother, believing she was not mentally deficient, took her from this family to the house where he roomed, secured accommodations for her, and at night proceeded to teach her himself with the aid of a speller and primer. In three weeks' time this girl had mastered simple arithmetic, including the multiplication table to twelve, and was

able to read a first reader without difficulty. This case illustrates not only the retarding influence of unfavorable circumstances, but also the danger of offhand diagnoses by anyone, and also the pedagogical principle that a personal interest in the pupil, as shown by this devoted brother, is essential to successful teaching.

PREVALENCE OF MENTAL DEFICIENCY.

The number of the evidently feeble-minded above 6 years of age may be said to be 1 to every 500 of the population. These figures are conservative and have been accepted by experts for years. They are well borne out by the careful census conducted in Philadelphia, in 1911, by the Department of Public Health and Charities.[1] On this basis the number of evidently feeble-minded above 6 years of age in Philadelphia is 3000, and in Pennsylvania is 15,000.

The proportion of children in the public schools who are feeble-minded may be set down at a minimum of 15 per 10,000. A teachers' census in 1908, made in Philadelphia by the writer and Dr. O. P. Cornman, revealed 442 children who, in the opinion of the teachers, were institution cases. Subsequent personal examination showed that 250 of these were *certainly* feeble-minded. The school population of Philadelphia is 170,000. There were 400 or 500 doubtful cases, in which the youth of the children and their poor surroundings made exact diagnosis impossible.

A chart showing the results of the Philadelphia investigation is given in the chapter on the Prevalence of Defects (page 606).

EVIDENCE AND DIAGNOSIS.

EVIDENCE.

Notwithstanding that it is not safe to judge one by his ancestry, his face, or his home surroundings, these factors often constitute valuable corroborative evidence. In the case of the facial expression, the muscular co-ordination, the control of the emotions, and certain paralyses suggesting brain injury, they

[1] See official bulletin, "The Number of the Feeble-minded."

almost constitute absolute evidence. It should always be remembered, however, that *the only absolute evidence of mental deficiency is the expression of the child's thoughts by his words and actions.*

The following grouping of the evidences of mental deficiency is practical and at the same time scientifically based:—

Indirect Evidence.

(*Simply Suggestive or Corroborative.*)

Bad heredity.

Ill health (poor nutrition, anemia).

Unfavorable environment.

Physical defects of mild degree.

Moderate retardation in school.

Numerous physical defects indicating a generally faulty make-up.

Semidirect Evidence.

(*Very Suggestive or Corroborative.*)

Severe defects of sight or hearing.

Organic brain disease.

Marked retardation in physical and mental development during infancy (parents' statement).

Marked retardation in school without good cause.

Lack of emotional control.

Defective nervomuscular tone.

Defective co-ordination.

Direct Evidence.

(*Deficient Intellect Shown by the Child's Words and Actions.*)

The child's school record.

Systematic tests of the various mental processes.

Tests of mental development (graded according to age), with more or less attempt at mind analysis.

1. *Bad heredity.* See Causes of Mental Deficiency (pages 368 and 380).

2. *Ill health.* See Causes of Mental Deficiency (pages 377 and 382).

3. *Unfavorable environment.* See Causes of Mental Deficiency (page 392).

4. *Physical defects of mild degree.* See Causes of Mental Deficiency (page 382).

5. *Moderate retardation in school.*

6. *Numerous physical defects suggestive of a generally defective organism* include particularly those known as the "stigmata of degeneration." Particularly may be mentioned poor circulation, small heart, chlorosis, misshapen skull, protruding asymmetrical ears, and general ugliness. High palate was formerly mentioned as one of the principal "stigmata," but it exists in most cases of adenoids, and in the feeble-minded and criminal is found frequently only because these are frequently mouth-breathers (see pages 264 and 318).

Lapage states that the skull of the feeble-minded fails to attain the normal circumference of twenty inches in 34 per cent. of all cases, the cranium is markedly asymmetrical in 20 per cent. of all cases, and is slightly asymmetrical in very many more, and that contracted palate and jaws exist in about 70 per cent. of all cases.

7. *Severe defects of sight and hearing.*

8. *Organic brain disease.* The evidence of organic brain defect is usually but not always apparent. The small cranium of the microcephalic child, the large, globular head with small face of the hydrocephalic child, the paralysis of the upper and lower limb on the same side with disturbance of speech in the child suffering from the effects of a cerebral hemorrhage make these conditions plain to any one. On the other hand, there are cases of meningitis and of head injuries received from a fall or other accident in which feeble mind may result without the least evidence, either by inspection or medical examination, that the brain has been injured. Two cases come to the mind of the writer in this connection. In both of these there was a history of previous scarlet fever with absolutely no other factor to account for the condition.

9. *A history of inability to walk and to talk* before the age of 3 years points strongly to feeble-mindedness.

10. *Lack of emotional control* is discussed on pages 349, 363, 404.

11. *Defective Nervomuscular Tone.*—Principally due to disuse because of the empty mind, the poor concentration and will power, and partly due to poor nutrition, the muscle tone of the feeble-minded is poor. The relaxed muscles are particularly seen in those parts which are developed *pari passu* with the intellectual development. Thus, the face is vacant, the back is rounded into a careless slouch, the gait is a characteristic shuffle or shamble. Speech is slovenly. Flat foot is frequent—not from the weight of a heavy body, but from the loss of arch support consequent upon relaxed tibialis muscles.

12. *Defective Co-ordination.*—Since co-ordination of the muscles is attained by practice alone, it follows that the purposeless, feeble-minded child is clumsy. This clumsiness is naturally seen in those groups of muscles which perform the most delicate actions. Thus, the happy, feeble-minded child grins rather than smiles. His hands are clumsy. His speech is often inarticulate.

The dexterity displayed in tying the shoes and buttoning the clothing is always worth noting. The *age* at which the child learned to do these things and also *the age at which he learned to walk and to talk* should be ascertained from the parents.

There are numerous tests of co-ordination, such as sticking pegs into holes, but the sureness of the running gait, together with the evidences already mentioned, will suffice. The form board, mentioned later in connection with form perception, also demonstrates the co-ordination quite well.

13. *The child's school record,* under certain favorable conditions, may be most valuable evidence. First-grade school work in number, letters, and pictures constitutes good test material, and if the child to be examined has been a regular attendant at school, with good health and decent parents, the evidence is already mostly in hand. Given a boy or girl over 10 years of age and apparently normal, examination procedure may well proceed along this line. It is my own custom at the Philadelphia House of Detention to start the mental examination in most cases by asking the boy to tell how he came to be arrested, and by close examination to elicit answers which show his reasoning power. Following this the boy is asked to read a book, of which

several are at hand, and to write. Unfortunately in the case of the majority of children examined, the previous school record is so fragmentary and hard to procure that it does not figure.

In many cases where the child presents a record of home poverty and ignorance, of truancy and frequent transfers, the examiner is compelled to place the child for three or four weeks under a good teacher to determine its capacity to learn. This is proof of the value of beginning school work as test material.

In the case of imbecilic and idiotic children simpler tests are necessary in order to elicit some response. Such children, as a rule, have not attended school at all.

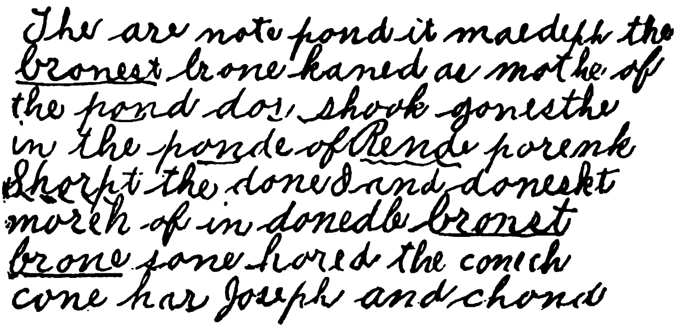

Ther are note pond it maedeh the
bronest brone kaned ae mothe of
the pond dos, shook gonesthe
in the ponde of Rende porenk
Shorpt the doned and doneskt
moreh of in donedb bronst
brone fone hored the conich
cone har Joseph and chond

Fig. 148.—Specimen composition of a 12-year-old feeble-minded boy. Only one-fifth of the page is here shown. The boy was asked to write what had happened to him today. Note the repetitions.

14. *Formal mental tests,* covering systematically the principal mental processes, constitute the best method of examination of very young children, and of those children who are of very low mental development. Such tests afford valuable evidence in all cases.

The practical use of such tests requires only a knowledge of elementary psychology. The tests are simple in character. The examiner should bear in mind that an examination systematically and scientifically made will occasionally reveal inequalities in the mental development which will be overlooked if the case is judged by one or two tests hastily made.

On the other hand, the practical purpose of the examination should be borne in mind. A psychological analysis including

the results of every test found in an advanced treatise is a digression from the work at hand and a waste of time. Such procedure is research work.

Similarly, the degree of mental development need not be ascertained in the sipirit of exact quantitative analysis. Diagnosis in the case of imbeciles and idiots does not require this. In the case of border-land (feeble mind) cases the mentality is

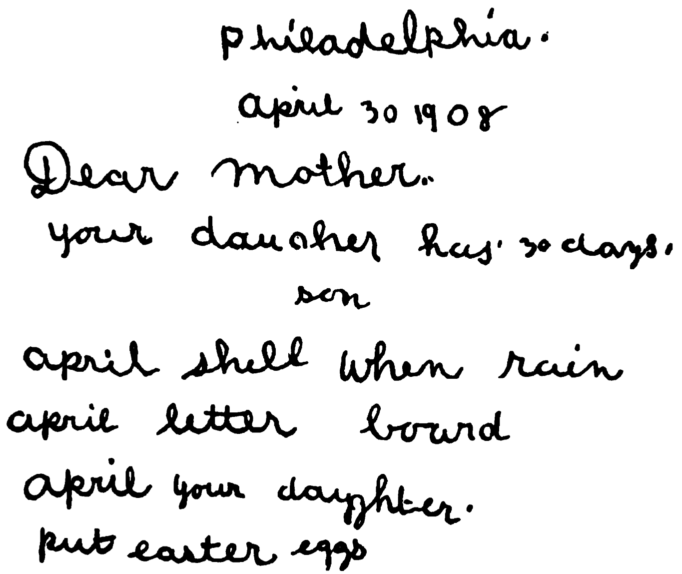

philadelphia.
april 30 1908
Dear mother..
your dauaher has. 30 days.
son
april shell when rain
april letter bound
april your daughter.
put easter eggs

Fig. 149.—Specimen handwriting of a feeble-minded boy 12 years old.

so influenced by the environment and health that too close concentration on any one factor is likely to produce a poor judgment on the case.

It is essential that all direct mental tests be conducted in the proper manner. Not only should the examiner endeavor to eliminate his own personality in the sense of encouraging or discouraging answers to any particular questions, but he should, throughout the test, bear in mind that he is dealing with a child. Confidence should be secured by a gentle, kindly manner, a few easy questions of no particular consequence, and by seating the child comfortably so that he will feel at home.

Perception, imitation, conception, attention, memory, association, and *reason* may be tested, in some instances in combination.

The intelligent reader, even if he has no previous knowledge of psychology, will realize that the demonstration of one psychological process will often perforce involve another. Thus, to ask a child to repeat a list of four words spoken aloud to him involves not only the matter of memory, but also hearing, attention, and speech. However, in the list of tests given below the process designed to be tested is usually evident, and is so tested that it does not involve other mental processes more complex than itself.

Perception of color, form, number, size, weight, and space may be tested. Perception alone does not require the *name* of the quality distinguished. For instance, the child shows that he distinguishes the red balls, the blue balls, and the white balls (kindergarten color papers are handy) by sorting them according to *color*.[1] Similarly, he may sort into groups the objects of different *form* (sphere, cube, disk, flat square, flat triangle, flat circle) and the objects of different *size* (large balls, small balls). *Number* perception is shown by sorting a dozen marbles into groups of two each or three each. *Space* perception is shown by placing sticks equidistant in a row. *Weight* perception by the use of pill boxes of equal size, but different weight. Either a graded series (to be placed by the child in a row according to their weight) or a light pair and a heavy pair of the pill boxes may be used.

The *form board* (see illustration) is a fine test of *form* perception. The child places the blocks in their proper beds or depressions. My own experience has shown that, while many feeble-minded children can put the blocks in place quickly, it is a fair rule that a child of school age unable to place the blocks in thirty seconds is a feeble-minded child.

Perception plus memory entails some knowledge of the object discerned. Most frequently the *name* of the object distinguished is inquired for, sometimes its use. Thus, the child may be asked to point out the "red" card. (If he is asked instead to tell the name of the color, the factor of speech is added into this test.) So he may be asked which is the "long one," the "short one," the "round one," the "square one," the "big one," the "little one," the "thick one," the "thin one," the "flat one" (see form perception). He may be asked to point out "two" marbles. He may be asked to state the names of common objects (pencil, knife, shoe), or coins, or words (reading). He may be asked to count a row of pennies or the marks on the blackboard.

[1] If by chance the child should be color-blind, red and green are the colors not distinguished. It is well, therefore, not to use these colors exclusively.

The recognition of *words* (*i.e.*, reading) in practically every case brings in not only the perception of the word and the memory of its pronunciation, but *also* the conception of that which the word signifies. The child is taught "cat" and "dog" in an illustrated reader. He knows the meaning of "my," "your," "hot," before he acquires ability to read words.

Fig. 150.—Testing form perception by the form board. (Courtesy of Dr. H. H. Goddard.)

The words used (test of reading) by the Philadelphia Committee are given on page 405. The lists are classed as "easy," "medium," and "difficult."

The power of *imitation* requires very little mentality, and, therefore, this test may be omitted except in the case of babies and idiots. The child may be asked to swing the arms in the same manner as does the examiner. After the coarser and easier movements have been tried, a finger exercise may be used, such as bending the fingers simultaneously and moving one finger from side to side. This test was first suggested by one of the earliest writers, Seguin ("Idiocy and its Treatment").

Conception, or the idea, is tested by asking the child to define or describe something. Thus: "What is a horse?" "a house?" "a chair?"

Conception of number may be tested by asking the child the sum of "six plus three," "two times two," "take away four from seven," etc. Calling for the multiplication table or division table is principally a matter of memory. Many children can be trained to rattle off the tables with no clear idea of number, but rather in the spirit of "eeny, meeny, miny mo."

Attention is better ascertained by the teacher in her daily work in the class room than by the examiner when testing the child alone. A child whose attention cannot be obtained during a special examination is almost certainly feeble-minded. A teacher who tells a story or shows a series of pictures to her class can detect at once those with poor powers of attention. They betray it by their wandering eyes and vacant facial expression.

Attention is so poor in adenoid children, in poorly nourished children, and in some adolescent children that it should not be used hastily in formulating a judgment on the mental capabilities.

Memory may be either *immediate memory* or *distant memory*. Distant memory is tested by asking the child his name, age, address, number of brothers and sisters. The spelling of words is a demonstration of distant memory. Almost all mental tests involve the process of distant memory. Thus, a child who reads words from a book not only uses his memory, but his perception of form, and usually he conceives an idea of the subject-matter of the text. Distant memory should be tested with a clear idea of what the child should know. Thus, an institution child, or even a girl living at home, naturally will not know the names of the neighborhood streets as well as a boy playing games outside every afternoon.

Immediate memory may be tested by having the child repeat after the examiner three, four, or five figures dictated by the latter. Thus: "three, eight, five, seven." "The clock strikes every hour, but when it is night no one hears it." The test of immediate memory unavoidably brings in also the factor of attention.

Reason or *judgment* is the most complex of the mental processes. Indeed, it may be said to be the resultant of all the lower mental processes. The reasoning power of man is his chief distinction from the lower animals, and intellectual superiority is mostly based on difference in reasoning power. What we call "common sense" is simply good reasoning power.

Reason, when analyzed, is found to consist of judgments, which, in turn, are based on comparisons. Each judgment or deduction is known to the logician as a syllogism.

We have already seen (see Emotive Children, pages 349 and 397) that those with good reasoning power usually possess good control over the emotions, and that feeble-minded children, on the other hand (with poor reasoning power), are distinguished by lack of emotional control. In an institution for the feeble-minded probably the foremost character-

istic of the children is their lack of good judgment in the course of their ordinary activities. (Johnstone.)

Tests of reasoning power are simple enough, and, yet, they should be made carefully, since a timid, confused child will not do himself justice, and success or failure to answer may depend upon the way in which the question is put. In this connection the examiner should remember that suggestion in the form of a leading question will go far toward vitiating a test. The child should be given a fair chance, but should not be furnished the answer ready-made by reason of too much assistance.

Such questions as these will test the reasoning power:—

"What would happen if I put my finger in the fire?"

"What would happen if I went out in the rain?"

"What will the dog do if I kick him?"

"Why does the man carry an umbrella?"

"Why do you wear an overcoat today?"

Or (exhibiting a picture of a girl and a broken doll), "Why does the little girl cry?"

The exhibition of pictures to children, for interpretation, as just mentioned, is a good test when the pictures are easy and suggestive. Such pictures may be used in the case of little children and border-land (or feeble-mind) cases. In the case of older children not evidently feeble-minded something more difficult must be used as test material, and the examiner may here question the child as to what should be done under such circumstances. Also the child may be asked to expose the fallacy in an illogical conclusion or nonsensical sentence. Such tests, put into simple language, are given in the Binet system of tests (ages 10 and 11), next to be described.

Following is shown the record card used by the Philadelphia Committee in its work in the schools. It is the reverse side of the card shown as Fig. 153. The numbers written on the card refer to the footnotes following.

[1] See page 402.

[2] Omitted as superfluous. (See form perception, page 402.)

[3] Easy words.	[4] Medium words.	[5] Difficult words.
is	bird	could
man	vest	country
see	give	field
you	read	butterfly
boy	dear	milkman
girl	letter	become
the	want	around
big	love	scold
ball	home	leave
like	her	yellow

These words to be read.

NERVO-MUSCULAR DEVELOPMENT

SPEECH Clear, inarticulate, fluent, hesitating, silent, intelligent, unintelligent. MANUAL DEXTERITY. (Co-ordination), Form board— 1 "A' TEST— 2 FACIAL EXPRESSION Intelligent, stupid, happy, sullen, animated, apathetic, stolid, nervous, interested, indifferent, silly, dogged, helpless. POSTURE Stooping, erect, spinal curvature. GAIT Normal, lively, shuffling, unsteady, clumsy. GRIP: R L

MENTAL DEVELOPMENT

Recognition of Objects, Qualities and Words — MATCHING OF COLORS Red, yellow, blue, green, white, black. COMPARISON OF SIZE (Long, short, big, little, thin, thick). RECOGNITION OF FORM Ball, cube, disc WEIGHTS.
NAMING OBJECTS (Pencil, knife, book, key, handkerchief, envelope) RECOGNIZING COINS: (Cent, nickel, dime, quarter). NAMING COLORS Red, yellow, green, blue, white, black NAMING FORMS Round, flat, square. WORDS: (Easy, 3 medium, 4 difficult 5)

Common Information — Age (says), birthday, father's name, address, brothers and sisters (their names, their number). Other intelligent information.

Word Tests — SPELLING (cat, dog, man, see, can, book, foot, house, father, thing, summer, spring, garden, clock, inch, flowers, picture, America, Europe, enough).
MEMORY Related words 6 Substantives for attributes; 7 Words for opposites. 8 Unrelated words 9
Pictures on card (time exposure, 30 seconds)

Number Tests —
Correct + ; + ; − ; − ; × ; × ; ÷
Incorrect + ; + ; − ; − ; × ; × ; ÷
Change computed

General Intelligence — INTERPRETING PICTURES—Easy (good, fair, poor); Medium (good, fair, poor); Difficult (good, fair, poor).

Diagnosis — DEGREE OF MENTALITY Dull, backward, backward-emotive, moron, imbecile, idiot.
PROBABLE CAUSE

Recommendations — Medical Social Educational

Fig. 151.—Reverse side of record card (Philadelphia). (Author's original card, modified.)

6 Related words (memory plus association), to be repeated by the child after dictation by the examiner:—

A	B
school	kitchen
teacher	stove
book	fire
desk	wood
pen	coal
read	hot
write	kettle
add	boil
spell	water
word	tea

7 Test of association (substantives for attributes). Tell me something that is:—

A	B
high	empty
soft	narrow
cold	loose
new	bitter
smooth	level
red	heavy
round	woolen
clean	bright
bent	wet
deep	good

8 Test of association (opposites). Tell me something that is the opposite of:—

high	hard	stout
light	kind	plain
noisy	old	cross
	small	

9 Test of immediate memory. The words are unrelated, so there is no help by association:—

A	B
book	long
tree	run
door	dress
pillow	knife
letter	friend
button	break
nose	green
glass	arm
fish	toy
plant	room

15. *Tests of mental development graded according to age (with more or less attempt at mind analysis—the Binet tests).*

The test system devised by Professor Binet,[1] of the University of Paris, is designed to present direct evidence of the mental development in a practical and easily determined form. The distinctive principle of the system is its graded series, a separate set of tests being used for each age from 3 to 13 years, inclusive.

Binet's idea is to elicit evidence and at the same time present this evidence in *age units,* so that each child tested is recorded as possessing a *mental age.* If the mental age and the physical age differ, the child is one, or two, or three years, as the case may be, behind or ahead of other children of the same age.

Binet claims that an absolute diagnosis (feeble mind or not feeble mind) can be made by this system. This will be discussed later.

There are about five tests for each age. The individual tests comprise a portion of those just mentioned in the preceding paragraph on formal mental tests, memory and reason being particularly tested. Thus, tests 2, 3, 8, 15, 18, 25, 29, 39, 50, and 52 are tests of immediate memory, while 1, 5, 7, 14, 19, 22, 28, 31, 32, 35, 36, 41, and 42 have distant memory as their principal element. In the ten, eleven, and twelve year tests the reasoning power is inquired into—tests 44, 45, and 53. Some of the tests assume previous school attendance—23 and 33, and probably 48. The teaching of ethics (?) in the French schools may explain the use of the latter.

In calculating the "mental age," Binet allows for failures in individual tests by a simple system of compensation the essence of which is the computation of an extra year's development for every five questions answered. This is explained in detail below.

Professor Binet claims that his tests are formulated after the examination of a large number of children, and that his "normal" standards are carefully calculated from the results of these examinations. The tests are as yet too new to criticize this claim. There is no question as to their *approximate* accuracy, for both my own series in the Summer School of the University of Pennsylvania[2] (July, 1910) and Dr. Goddard's series in the

[1] Translated by Dr. H. H. Goddard.
[2] Made by Miss Mollie A. Woods.

Vineland public schools[1] (December, 1910) show a plurality of the children to possess identical actual and mental age. Also experience has shown that children seldom pass a Binet test for an age higher than one in which they have failed. (The twelve- and eleven- year tests are exceptions to this rule, the eleven-year test being the more difficult.) Here and there individual tests

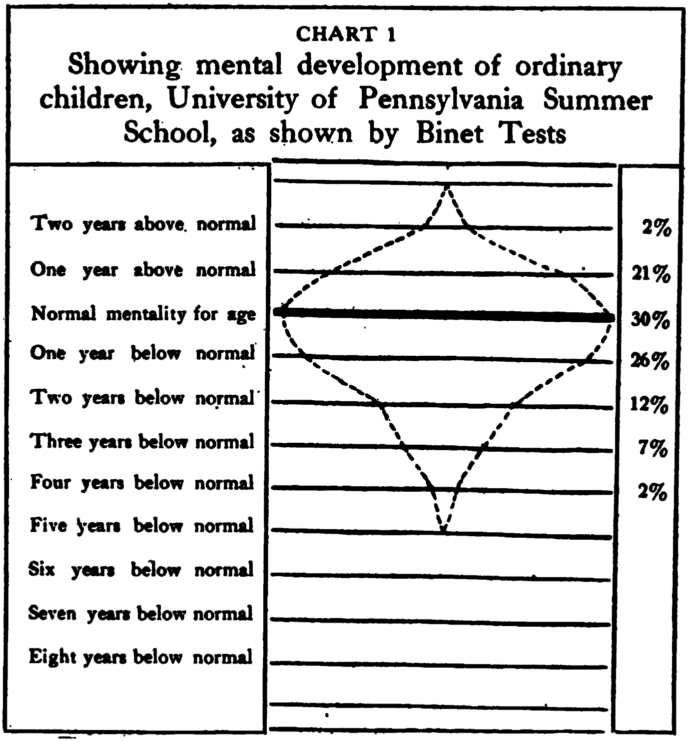


Fig. 152.—Showing the general accuracy of the Binet tests—a plurality of the children are found to be of normal mental age.

are out of the intended order of increasing difficulty (*e.g.*, 22, 31, 33, 36, 42), but these do not affect the result as expressed in "mental age." The value of the Binet tests is discussed in the next section, on Diagnosis. Following is shown the Binet test system. The translation is that of Dr. Goddard. The convenient arrangement is that of Dr. O. P. Cornman and Mr.

[1] Made by Dr. Goddard's laboratory staff.

Louis Nusbaum, of the Philadelphia Special Committee, appointed by the Board of Education. The writer, as the medical member of the committee, has used this form and endorses it:—

BINET TESTS OF MENTAL DEVELOPMENT.

(After Goddard's Translation. See vol. vi, No. 11, "The Training School," Vineland, N. J.)

Indicate Correct Answers by Check Mark (×).

(a) *The examiner should use, so far as possible, the exact language of the test.*

(b) *Unless otherwise indicated, all parts of a test must be answered correctly to pass.*

(c) *For test materials see page 4 and supplementary card.*

(d) *Page 4 of this sheet should be used for recording tests 11, 23, 24, 29, 33, 39, 40, 47.*

(e) *The following conventions should be observed in estimating mental development as indicated by the tests:—*

(1) *Credit the subject with the mental development of the highest age for which he has succeeded in all the tests but one.*

(2) *Advance him one year for every five higher tests passed, e.g., John is 9 years old. He fails in two of the nine-year tests. He should thus be classed as intellectually 8 years old. But he has done three of the nine-year tests and three of the ten-year tests, making six in all. He is, therefore, advanced a grade and recorded as normal.*

(f) *The result should be recorded on page 1, line 4.*

(g) *The child should be placed at ease and encouraged to answer freely, but no specific help other than as indicated in the tests should be given.*

3 YEARS.

1. "Where is your nose?" "Eyes?" "Mouth?"
   May be answered by a gesture.
2. "Say after me, 'It rains. I am hungry.' "
   There must not be a single error.
3. "Say after me, '7-2.' "
   Pronounce the figures distinctly, one-half second apart, and without emphasis on any one figure.
4. "What do you see in this picture?"
   Use any interesting picture of objects and actions within the range of childish experience. Suitable pictures may be found in primary reading books. The child should enumerate four things in the picture shown. He is not required to describe any actions.
5. "What is your name?"

4 YEARS.

6. "ARE YOU A BOY OR A GIRL?"
7. "WHAT IS THIS?"
   Show knife, key, penny.
8. "SAY AFTER ME, '7-4-8.' "
9. "WHICH LINE IS LONGER?"

5 YEARS.

10. "WHICH IS HEAVIER?"
    Use pillboxes of uniform size weighted with sand or shot; can be made up by any druggist. To identify the weights without disclosing them to the child, the initial of the weight should be placed upon each box, *e.g.*, S on 6-gram box, F on 15-gram box. Compare 3 and 12 grams; 6 and 15 grams.
11. "COPY THIS WITH PEN AND INK."
12. "MAKE A FIGURE LIKE THIS CARD FROM THESE PIECES."
    Place a visiting card on tne table; nearer the child place the two pieces, thus:—
13. "HOW MANY PENNIES ARE HERE?"
    Place four pennies in a row. Have the child count them with his finger.

6 YEARS.

14. "HOLD UP YOUR RIGHT HAND. SHOW ME YOUR LEFT EAR."
15. "SAY AFTER ME, 'WE GET UP IN THE MORNING; AFTER BREAKFAST WE WORK; AT NIGHT WE GO TO BED.' "
16. "WHICH IS PRETTIER?"
    (Show heads in pairs.)
17. "WHAT IS A HOUSE?" "A FORK?" "A TABLE?" "A CHAIR?" "A HORSE?"
    Kinds of response: 1. "A fork is a fork," or by pointing to an object. 2. In *terms of use*,—"A fork is to eat with." 3. *Better* than by use. This includes answers that describe the thing or even begin with "it is a thing," "it is an animal," etc.
    Three definitions by *use* pass.
18. "DO YOU SEE THIS KEY? PUT IT ON THAT CHAIR. THEN SHUT THE DOOR. AFTER THAT BRING ME THE BOX THAT IS ON THE CHAIR. REMEMBER, FIRST THE KEY ON THE CHAIR, THEN CLOSE THE DOOR, THEN BRING ME THE BOX."
    Child must execute the entire commission. Give no further help than here indicated.
19. "HOW OLD ARE YOU?"
    Answer in years passes.
20. "IS THIS MORNING, OR IS IT AFTERNOON?"
    If the time is afternoon, put the question, "Is this afternoon or morning?"

7 YEARS.

21. "WHAT IS MISSING IN THIS PICTURE?"
    See card. Show pictures one at a time. Three correct answers pass.
22. "HOW MANY FINGERS ON YOUR RIGHT HAND?" "HOW MANY ON YOUR LEFT HAND?" "HOW MANY ON BOTH HANDS?"
    Answers must be given without hesitation and exactly right without counting.
23. "COPY THESE WORDS."
    Use pen and ink. Passed if readable by one who is ignorant of the copy.
24. "COPY THIS FIGURE."
    Use pen and ink. Passed if recognizable as intended for a diamond-shaped figure.
25. "SAY AFTER ME, '4-7-3-9-5.' "
26. "WHAT DO YOU SEE IN THIS PICTURE?"
    See test 4. Same picture as used in test 4. Child should now *describe* actions or things instead of simply enumerating.
27. "COUNT THESE PENNIES."
    Place thirteen pennies in a row and have child count them with the finger. Finger must touch the piece as the child names the number. No piece must be counted twice and none omitted.
28. "WHAT IS THIS?"
    Show successively penny, nickel, dime, and quarter.

8 YEARS.

29. See card. Have child read the selection. Wait a few seconds and then say, "Tell me what you have read." Write down exactly his words, then count the number of memories that he has expressed. The possible memories are as follows: Three—houses—on fire—New York—September 5th—big fire—destroyed—last night—etc.
    Two memories pass.
30. "HOW MUCH ARE THESE STAMPS WORTH?" or "HOW MUCH MONEY TO BUY THESE STAMPS?" "COUNT."
    Should be done within ten seconds without any error.
31. "WHAT IS THIS COLOR?"
    Show successively the four colors, blue, red, green, yellow. Should be done in six seconds.
32. "COUNT BACKWARD FROM TWENTY TO ONE."
    Should be done within twenty seconds, and only one mistake of omission or transposition allowed.
33. "WRITE 'THE PRETTY LITTLE GIRLS.' "
    Passed if readable by one who is ignorant of the copy.

34. "WHAT IS THE DIFFERENCE BETWEEN A BUTTERFLY AND A FLY?" "WOOD AND GLASS?" "PAPER AND CLOTH?"
The question may be differently put so as to make it as intelligible as possible, *e.g.*, "Why are they not alike?" etc. Two at least of the answers must be correct. Allow two minutes.

9 YEARS.

35. (*a*) "WHAT DAY IS TODAY?" (*b*) "WHAT MONTH?" (*c*) "WHAT DAY OF THE MONTH?" (*d*) "WHAT YEAR?"
For question (*c*) answer within three days of correct date passes.

36. "NAME IN ORDER THE DAYS OF THE WEEK."
Allow ten seconds.

37. Play store, using real money. Child is storekeeper. Buy from him stamps that cost 9 cents. See card. Child must actually give 16 cents change as well as say it.

38. "WHAT IS A HOUSE?" "A FORK?" "A TABLE?" "A CHAIR?" "A HORSE?"
See test 17. Accept only definition *better* than by use.

39. "TELL ME WHAT YOU HAVE READ."
See test 29. Six memories pass.

40. Use pillboxes weighing 6, 8, 12, 15, and 18 grams. (See test 10.) Place the five boxes on the table in front of child and explain that they do not all weigh alike, and that he is to lift them one at a time, and put them in order from the lightest to the heaviest.
Record exact order in which child has placed boxes. Three trials allowed; two of these must be absolutely correct. Allow three minutes.

10 YEARS.

41. "NAME THE MONTHS OF THE YEAR."
To be done in fifteen seconds. Allow one omission or transposition.

42. "WHAT IS THIS?"
Use cent, nickel, dime, quarter, half-dollar, dollar, two dollars, five dollars, ten dollars.
Pieces should be on table in a row, but not in regular order of value. Have child point with finger and name as he points.

43. "MAKE A SENTENCE USING THE WORDS, 'PHILADELPHIA, MONEY, RIVER.'"
There are three forms of answer: (1) three separate sentences; (2) two ideas united by a conjunction; (3) a single idea involving the three words. Only the last two pass. Allow one minute.

44. "WHAT OUGHT A PERSON TO DO:—
(*a*) "WHEN HE HAS MISSED THE TRAIN?"

(b) "When he has been struck by a companion who did not do it purposely?"

(c) "When he has broken something that does not belong to him?"

(d) "When he is detained so that he will be late for school?"

(e) "Before taking part in an important affair?"

(f) "When asked his opinion of some one whom he knows only a little?"

(g) "Why does a person excuse more easily a wrong act committed in anger than a wrong act committed without anger?"

(h) "Why should a person judge another more by his acts than by his words?"

Allow twenty seconds to each question. Five correct answers pass.

11 YEARS.

45. "I am going to give some sentences in which there is nonsense. Listen carefully and see if you can tell me where the nonsense is."

Read the sentences slowly. Allow two minutes for the entire test. Three good answers pass.

46. "Use in one sentence the words 'Philadelphia, money, river.'"

See test 43. Only last form of answer passes.

47. "Say as many words as you can in three minutes,—as table, run, board, carriage, big. Some children have named two hundred words."

Record words as named. Sixty words pass. Duplications not to be counted.

48. "What is charity?" "justice?" "goodness?"

Two good definitions pass. They must contain the essential idea, even though poorly expressed.

49. "Make a sentence out of these words."

Place the printed words before the child. Have him give the sentence orally. Allow one minute for each sentence. Two given correctly pass.

12 YEARS.

50. "Say after me, '2-9-4-6-3-7-5.' '1-6-9-5-8-4-7.' '9-2-8-5-1-6-4.'"

Tell the child there will be seven figures. Allow three trials. One correct answer passes.

51. "Give as many words as you can think of that will rhyme with *day*, *spring*, *mill*."

Explain and illustrate what is meant by a rhyme. Allow one minute. Three rhymes for any one of the words pass.

52. "SAY AFTER ME, 'ERNEST IS PRAISED VERY OFTEN FOR HIS GOOD CONDUCT. I BOUGHT A BEAUTIFUL DOLL FOR MY GOOD LITTLE SISTER.' 'CHILDREN, IT IS NECESSARY FOR US TO WORK VERY HARD FOR A LIVING. YOU MUST GO TO YOUR SCHOOL EVERY MORNING.' "

One of these combinations of sentences to be repeated without error.

53. "I SHALL READ YOU A STORY CONTAINING A QUESTION. LISTEN CAREFULLY AND GIVE ME THE ANSWER WHEN I FINISH."

Both questions to be answered correctly.

TEST MATERIAL.

TESTS 29—11 YEARS, AND 39—9 YEARS.

"THREE HOUSES ON FIRE."

"New York, Sept. 5. A big fire in Hastings, last night destroyed three large houses in the center of the village.

Seventeen families are without shelter. The loss exceeds thirty thousand dollars.

While rescuing a child in his cradle, a barber's boy had his hands very seriously burned."

TEST 45—11 YEARS.

1. An unfortunate cyclist has had his head broken and is dead from the fall: they have taken him to the hospital and they do not think that he will recover.
2. I have three brothers, Paul, Ernest, and myself.
3. The police found yesterday the body of a young girl cut into eighteen pieces. They believe that she killed herself.
4. Yesterday there was an accident on the railroad. But it was not serious: the number of deaths is only 48.
5. Some one said "If in a moment of despair I should commit suicide, I should not choose Friday, because Friday is an unlucky day and it would bring me ill luck."

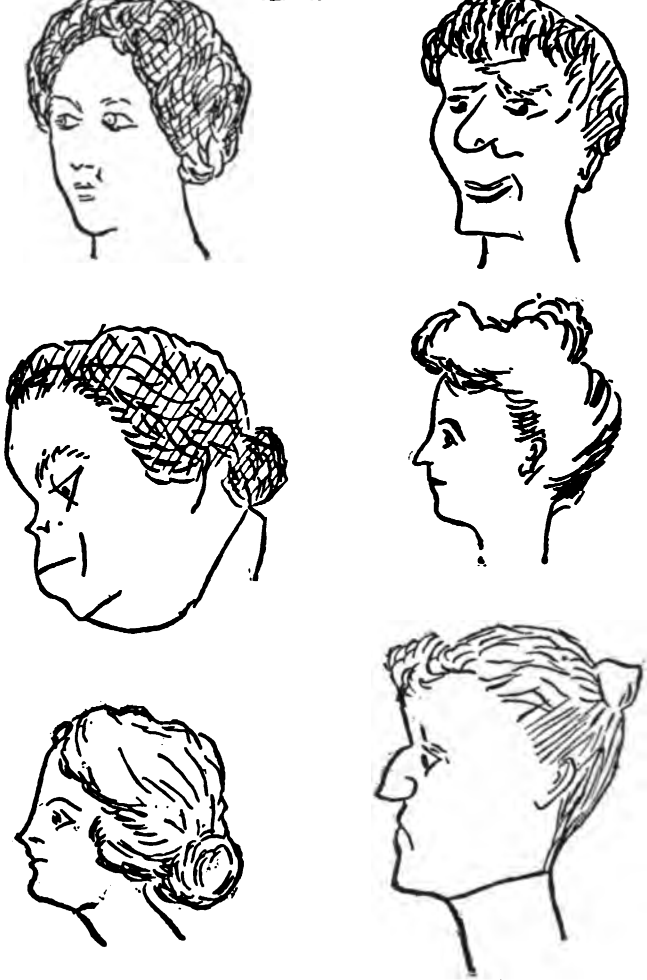
TEST 49—11 YEARS.

Hour — for — we — good — at — park — a — started — the.

To — asked — exercise — my — have — teacher — correct — my — I.

A — defends — dog — good — his — courageously — master.

TEST 16—6 Yrs.

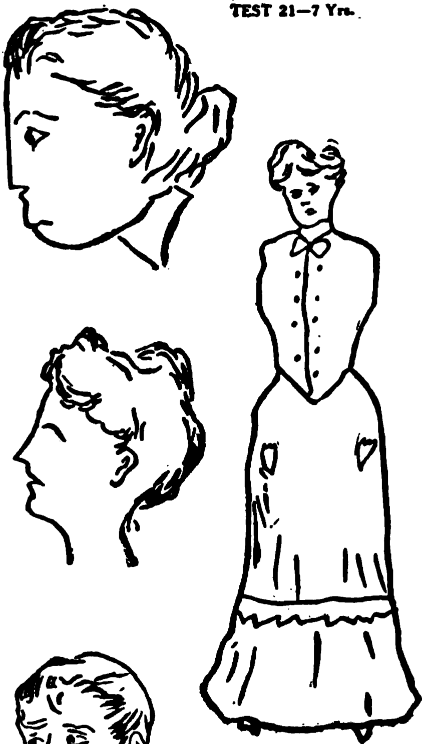


Tests 30—8 Yrs. and 37—9

POSTAGE STAMPS SHOULD BE PLACED IN SPACES AS INDICATED

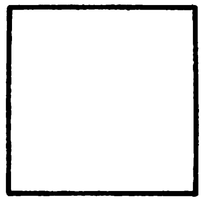
1 One Cent Stamp	1 One Cent Stamp	1 One Cent Stamp	2 Two Cent Stamp	2 Two Cent Stamp	2 Two Cent Stamp

TEST 21—7 Yrs.

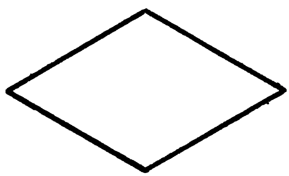


Test 9.

Test 11.



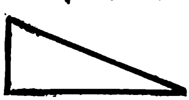
Test 24.



Test 23. *The Little Paul*

12. "MAKE A FIGURE LIKE THIS CARD FROM THESE PIECES."

Place a visiting card on the table; nearer the child place the two pieces, thus:—



TEST 53—12 YEARS.

1. "A person who was walking in the woods in Fairmount Park suddenly stopped much frightened and hastened to the nearest police station and reported that he had seen hanging from the limb of a tree a ——" (after a pause) "What?"

2. "My neighbor has been having strange visitors. He has received one after the other a physician, a lawyer, and a clergyman. What has happened at the house of my neighbor?"

DIAGNOSIS.

Diagnosis is a judgment in which the mentality of the child, his heredity, his health, and his environment are factors. The intellectual development is first ascertained and the influence of the other factors upon it is estimated. In case mental deficiency (which is by our definition a fact, not a condition) of doubtful degree exists, the diagnosis of *feeble mind* or *not feeble mind* is the most important issue.

The examiner who has had experience with children of foreign illiterate parents, children of illiterate negroes, deaf children, children with coexisting adenoids, deafness, and poor nutrition, children raised in old-fashioned orphanages or in almshouses, children raised by ignorant country people, half-starved children, will make his diagnosis cautiously. He knows that present attainment is not always a safe index of capacity, for he has seen these children improve marvelously after placement in a decent home.

Because of the slow development of a normal child's mind under adverse conditions, and the rapid development under favorable conditions, the limits of normality are exceedingly wide and elastic. It is not uncommon to find in the fifth grade children who are barely 8 years old, and also children who are 14, the latter being regarded as no worse than dullards mentally. By the Binet tests, to my personal knowledge two 6-year-old children passed the ten year test, while, on the other hand, the brightest boys of the truant schools and the Philadelphia House of Detention seldom pass the eleven-year test, no matter how old they may be. The difference is explainable by the difference in environment, the two little girls being daughters of professional men, surrounded by stimulating influences, while the boys come

from the lowest sort of homes. It is true, too, that the latter have a second-class heredity.

Hence, the supposition that a child is slightly feeble-minded who is two years, or four years, or any other arbitrary number of years behind the average mentally is fallacious.

This is the one unfortunate feature of the Binet tests. Some of its admirers have claimed that it not only presents the evidence of mental development, but that it also makes a diagnosis—"any child who is more than three years behind the average standard is feeble-minded." Such a diagnosis, based entirely on the direct evidence, without a thought of ancestry, malnutrition, adenoids, home illiteracy, or foreign parentage, is unscientific and often wrong.

A child of 6 years with the mentality of 2 years is evidently feeble-minded, but a child of 17 years with a mentality of 12 years is another proposition.

The valuable features of the Binet tests are four:—

1. They furnish a handy, quick, and fairly accurate method of testing the child's mentality.

2. They are serviceable to the ordinary grade teacher, the physician in general practice, and the parent, as they are simple and easily applied. The argumentative and doubting parent is quickly convinced when the child is tested according to an impersonal system, furnishing normal standards for each age.

3. From the third to the eighth years they not only present evidence, but go far toward making an immediate diagnosis.

4. After the eighth year they do not make a diagnosis because the variation within normal limits becomes too great. But they do present a good record of the child's present mentality.

Rather remarkably, it has been discovered by Goddard that feeble-minded children of the highest grade are just able to answer the twelve-year tests, and that the subgroups of the feeble-minded correspond to the different mental ages from 3 to 12 years. The feeble-minded children in question are those who have been institution cases under training for many years, whose maximum capacity is already known, and in whose case a diagnosis is already established.

The reader who is not familiar with idiocy and imbecility will do well to bear this correspondence in mind, as it will furnish

him with a double means of classification—this and Barr's already mentioned. (See page 364.)

As we shall see when discussing the special causes of feeble-mindedness and the special causes of dullness, the factors of degenerate ancestry, poor nervomuscular tone (particularly in the facial muscles), poor vasomotor tone, and lack of emotional control (yielding peculiarities of temperament) are those which predispose the examiner toward a diagnosis of feeble-mindedness in doubtful cases. If there is doubt of the existence of feeble-mindedness and only the factors of ill health and poor environment are present, the examiner will do well to make his diagnosis cautiously.

The diagnosis of the cause of existing mental deficiency is often as difficult as a correct judgment of the improvability. Cases frequently present a history of combined poor heredity, poor health, and low environment, and sometimes delusions exist which inject the question of insanity. The following is a good illustrative example:—

I was asked by the principal of one of the Philadelphia schools to examine a feeble-minded boy whose mother wished to have him attend school, but who was so evidently incapable that his formal admission was impossible. Searching for a cause, by questioning the mother, it developed that she had had eight children and two miscarriages. Of the eight children but three were living, the others having died in early infancy. This in itself pointed strongly to syphilis as the causative agency, but when the mother further stated that she had had continued convulsions at the birth of every child, and that she was subject to convulsions throughout her life, it would seem that either epilepsy or uremia of the parent or some accident at birth might also be responsible for the condition. This boy had an internal squint in one eye, kept his mouth continually open, and was poorly nourished. He was rather peculiar from the fact that he suffered from delusions, the strongest one being that he was employed by a butcher to slaughter cattle at a salary of eight or ten dollars a day.

The examiner should not allow importunate parents or teachers to force from him a premature judgment. The diagnosis of feeble-mindedness carries with it the pronouncement of an incurable condition. Very often the most skillful examiner, confronted with some poor, neglected waif or some deaf child, is unable to make at once a positive diagnosis. He has a right to

ask for the trial of the child under proper hygienic conditions and under a good teacher, and a further examination after such trial has been made and an intelligent report obtained. But, some will say, after all that has been done, anyone can make the diagnosis. Possibly so, and also the children will benefit by the medical attention given them. No special examiner who is honest claims anything more than sound skill and judgment born of experience. If he encourages the popular idea that he possesses wonderful insight, like a boardwalk phrenologist, he is a poseur and a charlatan.

On page 422 is the card record used by the Philadelphia Committee. It endeavors to bring out the principal facts bearing on the heredity, health, and environment of the child, so that a diagnosis may be better made. The reverse side of this card presents the record of the mental development (direct evidence) and has already been shown (see Fig. 151).

The Philadelphia Committee, in the course of its work, discovered about 100 cases of actual feeble-mindedness in the schools. Some of these, taken from the report of the committee, are here reproduced:—

Case 1.—Girl, 12 years. 1B Grade, Backward Class; 28 months in present grade. Prospects of promotion poor.

History:

Family—Sixth child; parents poor; illiterate.

Personal—Convulsions; small-pox; did not walk or talk until 6 years of age; willing and tries; good-natured; lacking in common sense; not dependable; memory and attention poor.

School—Attendance irregular, truant.

Medical Examination—Teeth decayed; limbs weak; knee-joints poor.

Development:

Nervomuscular—Speech hesitating; co-ordination poor; facial expression stupid, but pleasant; gait clumsy; slightly stooping posture.

Mental—Did not know age, birthday, address, or father's name; failed in simple grade tests.

Diagnosis—High-grade feeble mind.

Case 2.—Boy, 13 years. 1A Grade, Backward Class; 16 months in grade. Prospects of promotion poor.

History:

Family—Poor; home neglect; alcoholism; seven children; one brother feeble-minded.

Child's Name.. Date........................
Family Given

.... School, Dist. No. .... Birth { Date .... Place .... Order .... } { White / Colored } Understands English { Yes / No }

.... Principal

Parent's Name	Occupation	Residence	Birth Place	Educated / Can Read and Write / Illiterate
....	....	....	....	

Family History { Medical: Feeblemindedness. Insanity. Nervous Disorder. Alcoholism. Tuberculosis. Sickness or accident to mother before birth of child.

Social: FINANCIAL { Well-to-do / Moderate / Poor } HOUSING { Entire House, No. of Rooms........ / Apartment, " " .... / Tenement, " " .... } HOME TREATMENT { Good Care / Neglect / Brutality }

NO. OF: Normal { Living / Dead }; F. M. { Living / Dead }; BROS. SISTERS

Personal History { Medical: INJURY TO HEAD { At Birth / After Birth } ACUTE ILLNESS { Scarlet Fever / Diphtheria } Meningitis } Convulsions, Early Malnutrition ....

Social: Bad Companions Truant Lies Steals Profane Smokes Cigarettes Vicious Habits

Personal Characteristics: Good Common Sense Dependable Willing and Tries Good Attention Good Memory Good-Natured Affectionate Apathetic Restless Mischievous Quarrelsome Obstinate Incorrigible Cheats Marked Peculiar Traits

School History

Schools Attended: City, Country or Institution. (Specify) ....

Standing: Age Grade Mos. in Present Grade Mos. in Preceding Grade Prospects of Promotion { Good / Fair / Poor / None }

Attendance { Regular / Irregular / Punctual } Studies—ARITHMETIC { Good / Fair / Poor } WRITING { Good / Fair / Poor } SPELLING { Good / Fair / Poor } READING { Good / Fair / Poor } LANGUAGE { Good / Fair / Poor } DRAWING { Good / Fair / Poor }

PHYSICAL CONDITION

	EYES	EARS	NOSE	THROAT	SKIN, ORTH NERVOUS	TEETH	NUTRITION	MISC	SIZE FOR AGE
Medical Inspector's Record									
Present Examination	V. R. / V. L. / H. P. R. L. SQ. / GLASSES DATE. CH'D								Large / Normal / Small
Date Notified........ Result........									

PHILADELPHIA PUBLIC SCHOOLS
Backward Children Investigation

Fig. 153.—Author's chart modified (see page 421), giving information on health, environment, ancestry, and school record of a child. The reverse side, giving results of mental test, is shown in Fig. 151.

Personal—Bad companions; profane; lies; smokes cigarettes; has other vicious habits; restless; mischievous.

School—Attendance irregular; arithmetic, reading, and drawing poor; writing and language fair; spelling good for grade.

Medical Examination—Vision 5/6; nasal obstruction; nutrition poor; small for age.

Development:

Nervomuscular—Speech hesitating; unintelligent; facial expression happy, animated, silly; stooping posture; shuffling gait.

Mental—Partial failure in simple grade test; poor interpretation of pictures.

Diagnosis—Imbecile.

CASE 3.—Boy, 9 years. 1A Grade, Backward Class; 10 months in grade. No prospect of promotion.

History:

Family—Insanity; feeble-minded sister; parents poor.

Personal—Injury to head after birth; early malnutrition; diphtheria; very nervous; has always needed something to produce sleep; three years old when he started to walk; truant; lies; profane; smokes cigarettes; has vicious habits; lacking in common sense and affection; mischievous; quarrelsome.

School—Attendance fairly regular; studies all poor.

Medical Examination—Excitable; nervous; nutrition poor.

Development:

Mental—Absolute failure in all tests of even the simplest nature.

Diagnosis—Low-grade imbecile.

CASE 4.—Boy, 10 years. 1A Grade, Backward Class; 10 months in grade. Prospects of promotion poor.

History:

Family—Parents poor; illiterate; squalor; family of six in two-room tenement; alcoholism; home neglect.

Personal—Bad companions; truant; lies; smokes cigarettes; restless; mischievous; obstinate; effort, memory, and attention poor.

School—Attendance regular; studies all poor.

Medical Examination—Catarrh (ozena); enlarged tonsils; dry eczema of face; square, rickety head; no cartilage in nasal septum; bridge sunken.

Development:

Nervomuscular—Speech inarticulate; facial expression dogged.

Mental—Fails to recognize form and to name colors; cannot read or spell the simplest words; partial failure in simple number tests; does not know birthday, and lacks in other intelligent information.

Diagnosis—High-grade feeble mind.

CASE 5.—Girl, 12 years. 1A Grade, Backward Class; 10 months in grade. No prospects of promotion.

History:

Family—Poor; feeble-mindedness; tuberculosis; alcoholism.

Personal—Puny for a long time after birth; typhoid fever when 7 years old; early malnutrition; has had 100 convulsions in a single day; lies; restless; obstinate; good-natured and affectionate, but not dependable; effort, memory, and attention poor.

School—Attendance irregular and not punctual; all studies poor.

Medical Examination—Vision defective; appears to have some photophobia; nasal furuncle; slightly enlarged tonsils.

Development:

Mental—Cannot match or name colors or recognize form; does not know age, birthday, or address; failed completely in simple reading, spelling, and number tests, and cannot interpret easy pictures.

Diagnosis—Imbecile.

CASE 6.—Boy, 9 years. 1A Grade, Backward Class; 20 months in grade. No prospects of promotion.

History:

Family—Poor.

Personal—Bad companions; lies; smokes cigarettes; restless; quarrelsome; not dependable; attention and memory poor.

School—Attendance regular, but not punctual; all studies poor.

Medical Examination—Very anemic; defective vision, avoids the light, hangs head, probably photophobia; hearing very defective; slight nasal obstruction; flat chest; nutrition poor.

Development:

Neuromuscular—Speech hesitating, inarticulate, unintelligent; facial expression indifferent and silly.

Mental—Total failure in reading and spelling easy grade words; does not know age, birthday, address, father's name, or names of brothers and sisters; total failure in simplest number tests; cannot interpret easy pictures.

Diagnosis—High-grade feeble mind.

CASE 7.—Boy, 15 years. 1A Grade, Backward Class; 20 months in grade. No prospects of promotion.

History:

Family—Poor.

Personal—Scarlet fever; convulsions; injury to head resulting from fall from a second-story window; restless; not dependable; good-natured and affectionate; effort and attention fair; memory poor.

School—Attendance irregular and not punctual; all studies poor.

Medical Examination—Nasal obstruction; nutrition poor; slightly nervous; small for age; small head.

Development:

Mental—Does not recognize form; partial failure in reading easy words; cannot name colors; does not know age, birthday, father's name; has one brother, but gives a very large number of sisters and brothers; complete failure in easy grade spelling and number tests.

Diagnosis—Imbecile.

CASE 13.—Boy, 14 years. 3A Grade, Backward Class; 10 months in grade. Prospects of promotion poor.

History:

Family—Mother poor; nervous disorder; had operation for appendicitis eight months before birth of child, and a fall three months before.

Personal—Diphtheria; accident in 1904, sick two weeks, clot at base of brain; bleeding from nose; measles; nervousness; lack of blood causes stiffness in walk; lacks common sense; attention and memory poor.

School—Attendance irregular and not punctual; arithmetic, writing, and drawing poor; spelling, reading, and language fair.

Medical Examination—Vision 2/5; slight nasal obstruction; very nervous; slight paralysis legs and arms; high palate; evidence of brain injury.

Development:

Mental—Partial failure in easy spelling and number tests; does not know age.

Diagnosis—High-grade feeble mind.

CASE 24.—Girl, 11 years. 1B Grade, Backward Class; 10 months in present grade; 15 months in preceding grade. Prospects of promotion poor.

History:

Family—Seventh child; home neglect; mother poor; feeble-mindedness; father alcoholic, suicide.

Personal—Mischievous; quarrelsome; obstinate; not dependable; lacks common sense; effort, attention, and memory poor.

School—Attendance regular; all studies poor.

Medical Examination—Slightly nervous.

Development:

Nervomuscular—Speech clear, but hesitating; facial expression happy, silly.

Mental—Failure in simple spelling test and recognition of words; partial failure in simple grade number tests.

Diagnosis—High-grade feeble mind.

CASE 36.—Girl, 12 years. Colored. 2A Grade, Backward Class; 8 months in present grade; 30 months in preceding grade. No prospects of promotion.

History:

Family—Poor; good care.

School—Attendance regular; all studies poor.

Medical Examination—Defective speech; large for age.

Development:

Nervomuscular—Speech inarticulate; co-ordination very poor.

Mental—Can name only "white" and "black"; does not recognize form; partial failure in easy grade spelling and number tests; memory poor; cannot interpret easy pictures.

Diagnosis—Imbecile.

CASE 50.—Boy, 15 years. 5A Grade; 7 months in present grade; 20 months in preceding grade. Prospects of promotion poor. Has taken eight years to do the work of four grades.

History:

Family—Well-to-do; educated.

Personal—Early malnutrition; apathetic; lacks common sense; effort and attention fair; memory poor.

School—Irregular in attendance; arithmetic, language, and drawing poor; reading and writing fair; spelling good.

Medical Examination—Narrow nasal pillars; narrow arch in throat; twitching eyes and mouth; bites nails; under size.

Development:

Nervomuscular—Speech hesitating; facial expression nervous.

Mental—Partial failure in spelling first-grade words and complete failure in easy first-grade number tests; cannot interpret easy pictures.

Diagnosis—High-grade feeble mind. This boy was simply a lodger in the fifth grade because of his age and size.

CASE 63.—Boy, 10 years. 1A Grade, Backward Class; 26 months in grade. No prospects of promotion.

History:

Family—Moderate circumstances; three feeble-minded brothers living.

Personal—Scarlet fever; apathetic; restless; quarrelsome; obstinate; not dependable; attention and memory poor.

School—Attendance regular, but not punctual; all studies very poor.

Medical Examination—Nasal obstruction; stoop-shouldered; teeth decayed; nutrition poor; very nervous.

Development:

Nervomuscular—Speech inarticulate, hesitating, unintelligent; co-ordination poor; facial expression stupid, indifferent, silly; shuffling gait.

Mental—Has no idea of size or form; complete failure in reading and spelling simple grade words; does not know birthday, address, or brothers' names; lacks other common information; complete failure in easy grade number tests; cannot interpret easy pictures.

Diagnosis—Imbecile.

CASE 71.—Girl, 12 years. 2A Grade; 14 months in present grade; 20 months in preceding grade. No prospects of promotion.

History:

Family—Poor.

School—Studies all poor.

Medical Examination—Vision, right $\frac{1}{3}$, left $\frac{1}{10}$; nasal obstruction; slightly nervous.

Development:

Nervomuscular—Speech thick, lisps; drools; facial expression happy, silly; gait shuffling.

Mental—Does not know age, birthday, or names of all brothers and sisters; lacks other common information; partial failure in reading easy grade words and in simple grade number tests; memory poor.

Diagnosis—High-grade feeble mind.

CASE 72.—Boy, 9 years. 1A Grade; 15 months in grade. No prospects of promotion.

History:

Family—Tenth child; parents poor; home neglect; mother died of tuberculosis and alcoholism.

Personal—Apathetic; not dependable; attention and memory poor.

School—Attendance irregular; studies all poor.

Medical Examination—Nasal catarrh; very weak heart; cyanosis, can hardly walk upstairs.

Development:

Nervomuscular—Speech inarticulate, hesitating; facial expression stupid; stooping posture.

Mental—Has no idea of color, weight, or size of objects; cannot recognize form; does not know age, birthday, or father's name; lacks other common information; complete failure in easy grade spelling and number tests.

Diagnosis—Imbecile.

RESULTS OF MENTAL DEFICIENCY.

A. Results of Feeble-mindedness.

(a) Diseases and Defects.

It is difficult to separate some of the *originally associated* physical defects from those which result from low mentality. However, the vacant, silly face; the stoop shoulders and flat chest resulting from lack of vigor; the ill-developed nasal passages resulting from slovenly mouth breathing; the flat feet resulting from low tone of the tibial muscles; the slouching posture and shambling gait, are all characteristic effects. Infectious diseases find a fairly easy prey in the feeble-minded. The frequency of invasion may be due either to the diseased mouth conditions so often seen or to lack of vital resistance, but the high death rate is doubtless due to the latter condition.

(b) Intellectual Limitations.

It is said that the high-grade feeble-minded child can progress in school to the fourth grade if given sufficient time and attention. This, however, is a rosy picture. The children referred to may do this in the school room attached to an institution with "sufficient" time and attention, but in my own experience those feeble-minded children that attend school are in the first or second grades as scholars, or in the third or fourth grades as lodgers. The latter have been pushed up in order to find big enough desks for them, and in order to maintain their association with children of older age.

(c) Social Unfitness.

The feeble-minded, if left to themselves, fall into destitution and frequently into immorality. The term immorality is used in the conventional sense, as, of course, these unfortunates are not to blame. In order to show the fate of the feeble-minded we must look past the school age and see the feeble-minded after losing the protection of home and parents. This is not outside our province, for a principal aim of this book is to rouse the school teacher to the responsibility of the community for these defectives.

Destitution and Feeble Mind.

The great majority of the feeble-minded are destitute. In the large public institutions practically all the expense of maintenance falls upon the State. At home a few receive proper care, but the majority, being of poor families who can ill afford to look after them, drift out into the world, knock around doing the lowest laboring work, and ultimately end in almshouses, State sanatoria for tuberculosis, insane asylums, reformatories, and institutions specially designed for their care. In Philadelphia[1] the charitable agencies, in 1910, handled 211 cases, the almshouses 124; the insane asylums and public institutions for the feeble-minded together handled 1348 cases. These were more than three-fourths of the total census of the feeble-minded. Corresponding conditions are shown in the report of the English Royal Commission, already mentioned, in which 165 destitute feeble-minded women were found at Stoke-on-Trent, and in the workhouse at Manchester 105 feeble-minded men and 167 feeble-minded women were reported.

Immorality and Feeble Mind.

The term immorality is here used in the conventional sense, since these unfortunates are usually unable to control their passions and have little conception of right and wrong. Under this caption may be considered particularly sexual offenses and crimes of violence. Sexual offenses are difficult to trace except in the case of the woman who bears illegitimate children, the latter, of course, being no index to the number of offenses committed. It is the united testimony of those in closest touch with the situation that these women are the victims of employers, of laborers, sometimes of white-slave traders, and even of institution employés. Almost every almshouse has its record of illegitimate children born right in the institution, the fathers being either fellow inmates or attendants.

Propagation of the Feeble-minded.

That a great proportion of the women seeking maternity accommodations in almshouses are both single and feeble-minded

[1] See footnote, page 370.

is a well-known fact. Dr. Walker, recently in charge of the almshouse of Chester County, Pennsylvania, states that of 105 women delivered at that institution 100 were feeble-minded. The report of the Royal Commission, already twice mentioned, states that at Stoke-on-Trent 42 destitute feeble-minded women bore 78 illegitimate children.

The rate of propagation of the feeble-minded is far greater than that of the normal, since feeble-minded women produce children at any time after the age of 15, the greatest number being born between the ages of 18 and 30. In the Philadelphia Health Department bulletin already mentioned, "The Degenerate Children of Feeble-minded Women," are given the records of 20 feeble-minded women, who bore 60 children by 38 fathers—an average of 3 each. In the report of the Royal Commission is mentioned one town in which 61 feeble-minded women bore 158 children. The average number of children was here about 2⅔. It has already been noted that most of these were illegitimate (and a large number feeble-minded).

Crime and Feeble Mind.

The Philadelphia census of the feeble-minded, with its total of 1947 known cases, included 142 in the two reformatories for boys and girls. The prisons, which doubtless contained some cases, were not included in the inquiry, because of the difficulties here encountered in diagnosis. Tramps and alcoholics of weak mentality may or may not be feeble-minded, since many are wrecks of formerly normal men.

Confining the subject to the sphere of juvenile feeble mind and crime, it is generally known that most youths guilty of homicide, arson, burglary, and rape are claimed by their families to have been mentally irresponsible from their earliest years. Without effort of memory any Philadelphian who reads the newspapers (the year 1911) can remember a boy in southern New Jersey who committed homicide, and a young man in Berks County who murdered a jewelry peddler and hid the body in the chicken house. Both of these were said to be irresponsible mentally, and if the facts cited were true they certainly were feeble-minded. Not long since, a press despatch stated that a

feeble-minded negro youth was hanged in Richmond, Virginia. At hand is an Associated Press item (date of January 30, 1911), from Louisville, Kentucky:—

To Hang Feeble-minded Negro.

LEXINGTON, KY., Jan. 29.—The last execution by hanging in this State will take place tomorrow, when James W., 18 years old, a feeble-minded negro, will be hanged at Pineville for the murder of a white girl. The death sentence will hereafter be carried out by electrocution.

During the second and third weeks of March, 1911, there was a murder trial at Albany, New York, of a woman accused of killing her 5-year-old son:—

Philadelphia *Public Ledger,* date of March 14, 1911:—

ALBANY, N. Y., March 14.—Interest in the trial of Mrs. Edith M. for the murder of her 1-year-old son has waned considerably since the defense was stated to be insanity. The crowd about the Court House today was not large, and was composed mostly of women.

Alienists for the defense testified that Mrs. M. became insane just before the birth of the boy whose life she took by forcing carbolic acid down his throat. "Imbecile insanity" is what Dr. Jesse S. called Mrs. M.'s form of mania, and he was corroborated by Dr. Herbert E. DeF., of Troy.

Interest was intense when Mrs. Mary G., of Syracuse, sister of Mrs. M.'s father, told falteringly the sordid story of the home life of the accused woman during her childhood. She said that her father was a barroom loafer and earned his living around saloons and other places in Syracuse. He died in St. Joseph's Hospital from delirium tremens, strapped to a hospital bed. When he came home drunk, she said, his daughter, then 10 years old, used to "make faces" at him.

Dr. McK. pronounced Mrs. M. a physical as well as mental monstrosity.

"Her head is too small and is poorly developed," he explained; "eyes weak, one of them crossed; one ear deformed and the other abnormal; one shoulder-blade two inches higher than the other, and one leg an inch shorter than the other; face one-sided; skin cold and clammy, and—as you may see—ghastly in color; over arch of mouth bony protuberance that is one of the signs of degeneracy."

These are but a few items in the doctor's gruesome catalogue of physical deformities. He declared that the woman was an incorrigible liar and was absolutely without power to distinguish right from wrong.

Alcoholism and Feeble Mind.

Drunkenness is common in the feeble-minded of high grade, owing to the lack of control of the appetite. Without attempting conclusions as to which is the prior condition, the results of an investigation of the mental capacity of the inmates of a public institution for inebriates may be cited:—

In England, according to Dr. Brantwaite, H. M. I. of Inebriate Homes, 62 per cent. of all the cases committed to these homes are insane or mentally defective. This statement is indorsed by Dr. Gill, the Director of the Langho Inebriates' Reformatory. The former further states that mental incompetence stopping short of insanity holds a prominent position in the causation of habitual drunkenness.

One of the most needed medicosocial investigations is that of the nervous heredity of drunkards of all classes.

B. Results of Dullness and Backwardness.

There are so many dull and backward children and consequently so many adults of the same relative mental grade that their existence and fate are popularly taken as everyday and natural occurrences. There are certain pathological and antisocial features existing in this class, however, which may well be pointed out even though in a few words only.

Diseases and Physical Defects.

The dull or backward child of school age finds the school system itself to be his first enemy. Failing in his lessons, he is detained after school, with consequent loss of fresh air and exercise. In the course of a few years he finds himself in a room with children younger than himself and desks two or three sizes too small for him. I have seen such boys sitting on kindergarten chairs and using ordinary wooden-seated chairs for desks, the back bowed, and the chest contracted to the smallest possible space. With increasing years and the passing from parental care to self-government, a lack of personal hygiene is often painfully evident. Not only soiled clothes, but poor complexion, unclean skin, and decayed teeth, betray this. The natural drifting

Fig. 154.—Truant school children classed as disciplinary cases, but primarily dull and backward.

Fig. 155.—Disciplinary cases in truant school. Poor scholars, but delinquent primarily from social causes.

together of the weaker class results in the contraction of vicious habits and the spread of venereal disease. In adult life the health of the dull and backward is notoriously lower than that of the intelligent because of the small earning capacity with consequent poor living conditions and increased liability to tuberculosis, pneumonia, and other diseases.

Limited Education.

The dull and the backward present a problem to the school authorities because they possess the right to a place in the public school, but are not able to keep up with the regular graded course of study. A clogging of the regular classes results. The dullards learn but little because they need individual attention and less daily mental work; the brighter children lose valuable time because of the diversion of the teacher's activities to the relatively few dull pupils; the teacher suffers twice the wear and tear by reason of double work.

For this reason an elastic curriculum and special classes employing special methods (later described) are necessary to an efficient educational system.

Social Failures and Offenses.

As we have learned, the average dull individual presents little of peculiar interest. It is worth remembering, however, that the lower the mentality the poorer, as a rule, is the emotional control, and consequently the alcoholics and criminals of the community as well as the paupers are recruited from the inefficient.

The juvenile delinquent is usually the result of mental deficiency, or poor home conditions, or both. In an investigation undertaken by the writer, in conjunction with Miss Mollie A. Woods, Principal of one of the Philadelphia special schools, and Mr. J. P. Murphy, Secretary of the Children's Bureau of Philadelphia, it was shown clearly that about 7 per cent. (1 of every 14) of the delinquent boys handled by the Bureau possessed feeble-minded parents, while alcoholism, well known as a hereditary cause of mental deficiency, existed in many other parents. Without attempting to determine whether the mental

grade existing was inherent or simply due to physical defects and poor home surroundings, and also waiving the question whether the delinquencies committed were due to mental deficiency or to social causes, it is interesting, nevertheless, to note that at least *delinquency and mental deficiency are closely associated conditions.* The accompanying comparative chart, showing the mentality of the ordinary children in the University of Pennsylvania School of Observation contrasted to that of delin-

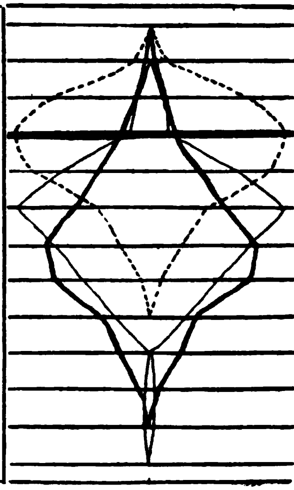
Fig. 156.—Truant school children classed as disciplinary cases, but primarily dull and backward.

quent boys in the House of Detention and delinquent boys handled by the Children's Bureau, demonstrates that the mildly delinquent boys of Miss Wood's special school and the Children's Bureau (mostly truants) were of inferior mentality, and that the House of Detention boys, legally criminals, were of still lower mentality. It may be noted that the physical condition of delinquent boys is shown to be inferior to that of ordinary children in the table shown on page 576.

Remembering the large number of dull and backward children whose existence has been demonstrated, we find here the strongest argument for the control of the liquor traffic and the social evil, and for the regulation of factory conditions so that

these weak ones will be protected from unscrupulous employers and from themselves.

Comparison of mental development of three classes of children as shown by Binet Tests



	Ordinary Children University of Penna. Summer School		Disciplinary Cases Philadelphia Special Public School		Delinquent Children Phila. House of Detention	
	Per Cent.	No. of Cases	Per Cent.	No. of Cases	Per Cent.	No. of Cases
Two years above normal	2%	1	0%	0	1%	1
One year above normal	21%	13	3%	2	3%	3
Normal mentality for age	30%	18	4%	3	5%	5
One year below normal	26%	16	19%	14	11%	11
Two years below normal	12%	7	29%	20	16%	16
Three years below normal	7%	4	21%	15	23%	23
Four years below normal	2%	1	15%	11	22%	22
Five years below normal			8%	6	10%	10
Six years below normal			0%	0	7%	7
Seven years below normal			1%	1	2%	2
Eight years below normal			1%	1.		
	100%	60	100%	73	100%	100

Fig. 157.—Chart showing inferior mentality of delinquent boys.

THE EDUCATION AND CARE OF THE MENTALLY DEFICIENT.

(a) The Feeble-minded.

MEDICAL TREATMENT OF THE FEEBLE-MINDED.

Medical treatment, except in the rare cases of thyroid deficiency, is principally for the purpose of maintaining physical health. Of course, many feeble-minded children can be helped by provision of eye-glasses, or cure of defective hearing, just as any one can be helped. One, however, must not expect too much.

Education of the Feeble-minded.

We have here two opposing views, that of the teacher and that of the sociologist.

The teacher realizes that the imbecile can be taught to do industrial work, and the high-grade can be taught to do both industrial work and a little school work. Education also, by reason of the mental exercise incurred, makes the face brighter, and the sensibilities for enjoyment keener. The parent of the feeble-minded child is made happier by the fact of the child's acquiring knowledge. Therefore, teach the feeble-minded child in the school room as well as in the shop and field, and try to give to this child as much mind as possible.

The sociologist, who is best personified by the average institution superintendent, realizes that the feeble-minded person is a defective product. He realizes that an irritable nervous system, when strained to its utmost capacity, breaks down. He realizes that most of the school work done by the feeble-minded is of the poll-parrot kind, slowly learned and quickly forgotten; that keener sensibilities for pleasure mean also keener sensibilities for pain and sorrow. He realizes that many parents will be misled by poll-parrot school recitations and the ability to write a few words, and will wonder if their child is really feeble-minded at all. He realizes that the selfish parent who wants his feeble-minded boy at home to sell newspapers on the corner finds in this educational exhibit the strongest argument for legal release proceedings.

He realizes that health and happiness are universally attained by doing something that one is able to do well without painful effort. He does not push the feeble-minded child into the work of normal children, as the wise teacher does not make a small child try to do the work of a high-school student. Rather, he promotes happiness by centering on industrial training, giving school work only to those who can really do it.

Shall the feeble-minded child be provided for in the public school system? Theoretically, no, because he is not a normal child mentally and because society demands that he be placed in a good institution. *Practically, yes, until he can be transferred to such an institution,* because such a child should not be turned

loose on the streets. In school he is safe personally and his presence is a stimulus to procure for him custodial care. At the present time our municipal and school authorities are pursuing a policy that is absolutely wicked. Neither wants the feeble-minded child, and neither makes provision for him. If his parents send him to school he is allowed the use of a seat. If he drops out of school the teacher is relieved. No compulsory education papers are served on him! If he has no home he gets a bed in the almshouse.

Because provision for young feeble-minded children by the school authorities is a proper duty, the handling of these children in the public schools is discussed along with the education of dull and backward children. (See page 444.)

Custodial Care for the Feeble-minded.

The constant aim of the teacher and the physician should be to place the feeble-minded child in a proper institution. Such an act provides protection to the child and for the community.

It is true that certain types of feeble mind are accidental in origin and, therefore, not transmissible. Such are the Mongol, the hydrocephalic, the cretin, the postmeningitic, and the cerebral hemorrhagic. These, however, comprise probably less than 10 per cent. of all the feeble-minded. Furthermore, they usually possess such a very low grade mentality and such an unfortunate appearance that procreation in their case need not be considered. If all the feeble-minded were of this kind there would be no danger to the community. It is the *high-grade* feeble-minded man or woman, fairly normal in appearance, the child of degenerate parents, who drifts from laboring work or factory work to charitable agencies, rescue homes, almshouses, and reformatories, that produces feeble-minded and illegitimate children.

Not only should the feeble-minded be kept from the almshouse, insane asylum, and jail. The institutions designed especially for the feeble-minded should provide separate care for the high-grade and low-grade cases. This is the present urgent need. The high-grade cases in an institution under wise

Fig. 158.—High-grade feeble-minded girls. Institution cases.

management are practically self-supporting—are able to do farm work and shop work. It is cruelty to such people to put them in close contact with helpless low-grade imbeciles and idiots. In the case of children, in the past, such a policy has deterred parents from placing their children in our public institutions.

The community benefits by the elimination of degenerate strains of stock. This is accomplished not only by the segregation just mentioned, but also by legal prohibition of marriage and by sterilization.

Legal prohibition will not do very much under present conditions, but it is a step in the right direction. In the future, when the records of degenerate families are better known to the authorities, such a law may prove useful. New Jersey, in 1910, passed an act concerning marriages, from which we quote:—

> From and after the first day of July, Anno Domini one thousand nine hundred and ten, it shall be necessary for persons intending to be married within this State to first obtain a marriage license and deliver the same to the clergyman, magistrate, or person who is to officiate before the proposed marriage can be lawfully performed; provided, no license to marry shall be issued when either of the contracting parties, at the time of making the application, is under the influence of intoxicating liquor or a narcotic drug, or is an imbecile, epileptic, or of unsound mind, nor shall any such license be issued to any person who is, or has been, an inmate of any insane asylum or institution for indigent persons, unless it satisfactorily appears that such person has been discharged from such asylum or institution.
>
> . . . .
>
> If any person or persons, or any religious society, institution, or organization, having authority to solemnize marriages, shall perform any marriage ceremony between parties without the presentation of a license therefor, obtained in accordance with the provisions of this act, he shall be deemed guilty of a misdemeanor, and shall, upon conviction, be sentenced to imprisonment for a term not exceeding six months, or to pay a fine not exceeding five hundred dollars, or both, at the discretion of the court.

Sterilization of feeble-minded individuals has been not only proposed, but practised officially in Indiana, California, and Connecticut, semiofficially (through consent of parents) in New Jersey, and unofficially in Kansas. Such a practice should, of course, be accompanied by all possible safeguards, but, in view of the fact that already in the case of the male the vasectomy

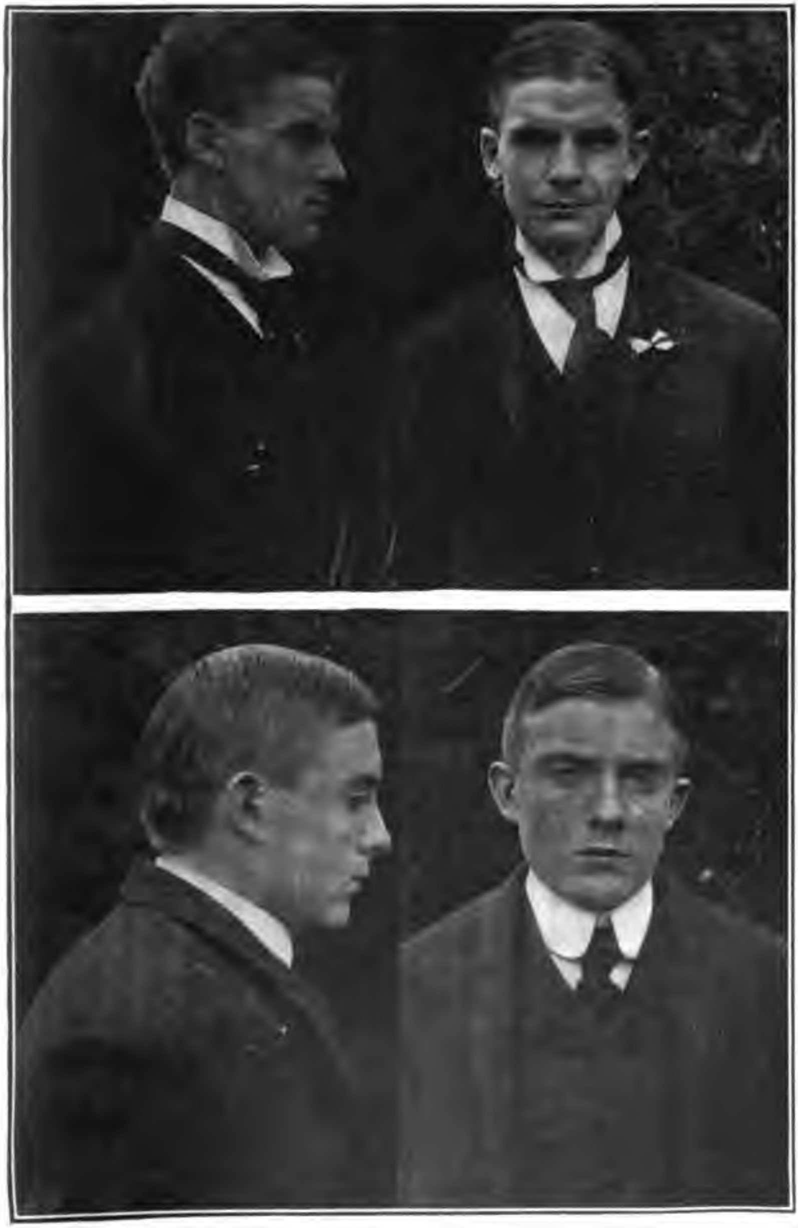


Fig. 159.—Feeble-minded boys. Institution cases.

operation offers a means of sterilization without castration and unattended by danger, the procedure is warrantable in State charges. At the present time the Legislature of Pennsylvania is considering a bill "to prevent the propagation of idiots, imbeciles, and feeble-minded persons by the process of sterilization under certain circumstances, and prescribing the conditions under which it may be performed." The passage of this act will be a great advance in social legislation, greatly reducing the number of feeble-minded persons who would otherwise burden the next generation.

Concerning the life of the child in a proper institution for the feeble-minded, little can be said here. The modern institution for feeble-minded children is a home and a training school rather than a bare asylum. Speaking as one who has seen hundreds of these children happy under kind care and permanently protected from destitution and rapine, there is no doubt that in this care by the fortunate of the unfortunate the State exercises its noblest functions.

(b) The Dull and Backward.

Medical Treatment of the Dull and Backward.

The relation between adenoids, poor nutrition, defective hearing and defective vision, on the one hand, and poor scholarship, on the other, has already been demonstrated in the chapters dealing with those physical defects and in this chapter in the section dealing with the causes of dullness. It would be repetition to dwell at length here on the benefits of eye-glasses, surgical operations, fresh air, and good food. Suffice it to say that, though one can never absolutely promise improvement through the removal of some physical defect because perchance the brain may be inherently defective, there is decided mental improvement in the average case of adenoids, poor nutrition, or defective hearing which has received medical attention, and in a considerable number of eye-strain cases as well.

Mental Stimulation by Improved Environment.

Although well aware that much of the mental deficiency encountered in school children is the result of ignorance and low

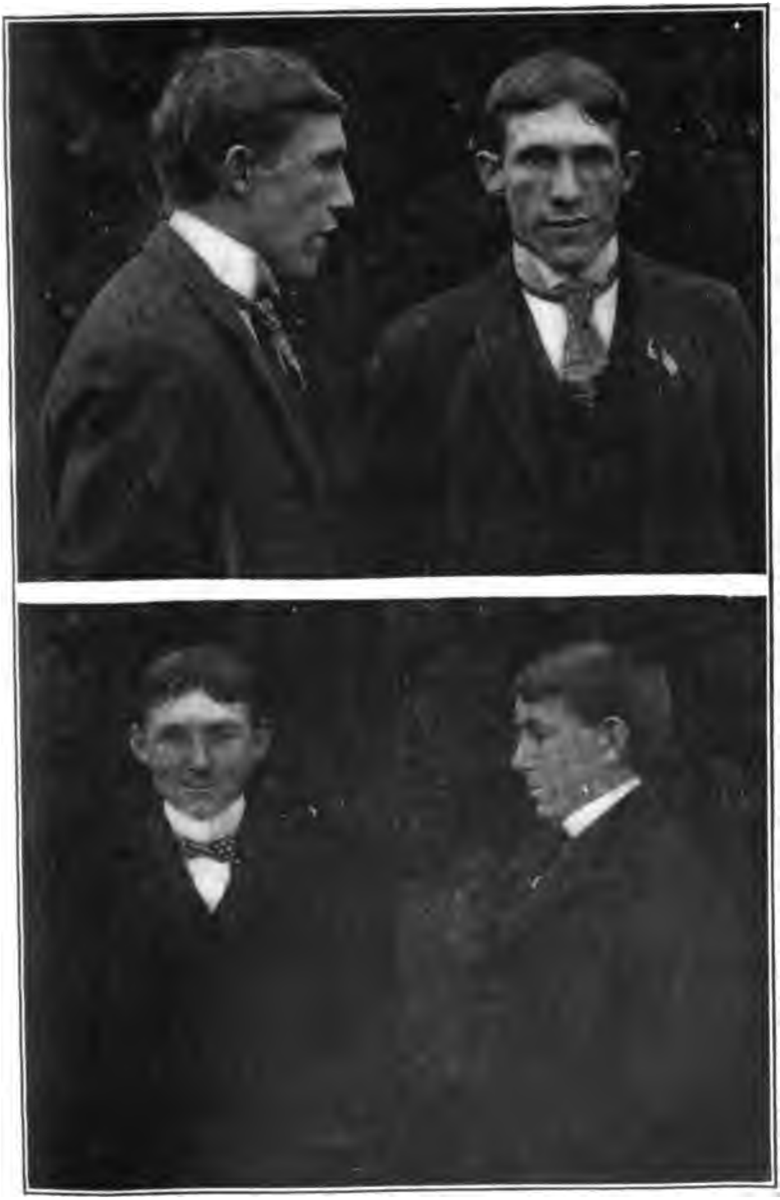


Fig. 160.—High-grade feeble-minded boys. Institution cases.

standards at home, the physician and teacher are almost powerless to change such conditions. The standard of living cannot be permanently raised by a half-hour's talk with the parent. In this dilemma the initiative of the child himself sometimes provides the means of improvement. The Home and School Association, with its inspiration to poor mothers, the child welfare and public health exhibits especially designed for school chil-

Fig. 161.—Feeble-minded girl. Institution case.

dren, and, best of all, the personal inspiration of good teachers awaken in thousands of the children of the poor the realization of better things and the desire to attain them. We are just beginning to realize the tremendous uplifting influence which the school house may exert upon the moral and mental tone of the surrounding neighborhood.

Instruction of Mentally Deficient Children.

The secret of good teaching generally, as the writer sees it, is in the use of association. The gifted teacher holds the atten-

Fig. 162.—Dull children, Americans, two and three years retarded.

Fig. 163.—Dull and backward children, Russian, Jewish, and Italian.

tion of the pupil and fixes the subject-matter in the latter's memory by the use of concrete illustrating objects, by bright stories which illustrate the point, by injected comparisons or contrasts, by the simultaneous use of muscles (manual training).

The teaching of deficient children is essentially along the same lines. One simply bears in mind that he is dealing with the intellect of a small child, no matter what the actual age may be. The classes must be small because individual instruction is necessary in most cases.

In short, we may say that the three essentials in the teaching of mentally deficient children are:—

1. Individual attention (small classes of fifteen to twenty).
2. Concrete object teaching (kindergarten apparatus).
3. Manual training.

To this may be added a fourth, physical education, for in the case of deficient children even these coarse movements (that is to say, coarse as contrasted to the fine movements of the hand) are learned laboriously, and, therefore, give mental exercise.

The daily program of the special class should be definite in character, or the variety of work and the variety of children will produce confusion. On one occasion a newly appointed special class teacher told me frankly that she did not know exactly what to do, and appealed for aid. So far as I know, no book on the instructions of deficient public school children is on the market, possibly because the matter is too simple to warrant a special book. At the Wood School (Miss MacFarlane), Philadelphia, situated in a very squalid neighborhood and peopled by the poorest, lowest class of native Americans, the three special classes maintain a definite daily program, which is here reproduced:—

Class 1.—Dull and Backward Children.

9.00- 9.10.	Opening exercises.
9.10- 9.25.	Language (4th year).
9.25- 9.40.	Language (2d and 3d years).
9.40- 9.50.	Gymnastics.
9.50-10.00.	Arithmetic (4th year).
10.00-10.10.	Arithmetic (3d year).
10.10-10.20.	Arithmetic (2d year).
10.20-10.30.	Phonics.
10.30-10.45.	Recess.

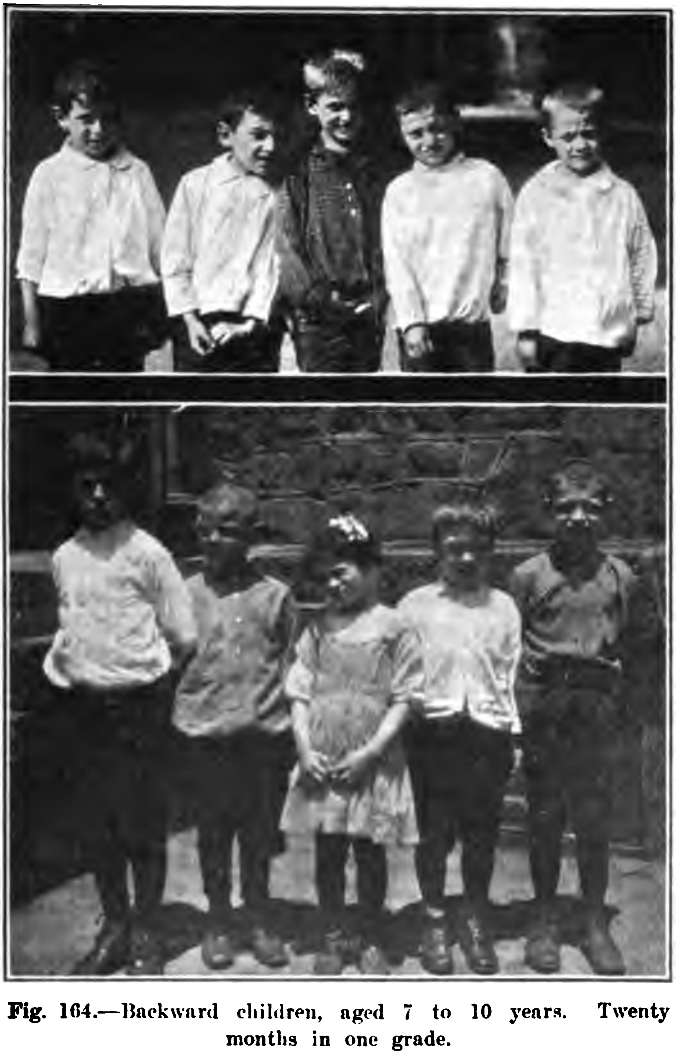


Fig. 164.—Backward children, aged 7 to 10 years. Twenty months in one grade.

10.45-11.00.	Written spelling.
11.00-11.10.	Music.
11.10-11.20.	Reading (4th year).
11.20-11.30.	Reading (3d year).
11.30-12.00.	Manual work.
1.00- 1.10.	Opening exercises.
1.10- 1.25.	Writing.
1.25- 1.35.	Geography (4th year).
1.35- 1.45.	Geography (3d year).
1.45- 1.55.	Reading (2d year).
1.55- 2.15.	Drawing.
2.15- 2.30.	Recess.
2.30- 3.00.	Manual work.

Class 2.—Backward and Feeble-minded. Ages, 6 to 12 years.

9.00- 9.10.	Opening exercises.
9.10- 9.30.	Language (poem, sense training, nature picture story).
9.30- 9.55.	Number; 2 classes.
9.55-10.05.	Physical exercises.
10.05-10.20.	Number; 3d class.
10.20-10.30.	Word recognition and phonics.
10.30-10.45.	Recess.
10.45-11.30.	Reading; 3 classes.
11.30-12.00.	Handwork (woodwork, cardboard construction, clay, raffia, braiding, and weaving).
1.00- 1.15.	Dictate spelling.
1.15- 1.27.	Music.
1.27- 1.45.	Drawing.
1.45- 2.15.	Handwork (card sewing, paper mats, stenciling, paper folding).
2.15- 2.30.	Recess.
2.30- 2.40.	Writing.
2.40- 3.00.	Spelling.

Class 3.—Backward and Feeble-minded. Ages, 10 to 16 years.

9.00- 9.12.	Opening exercises.
9.12- 9.30.	Language.
9.30- 9.45.	Physical exercises.
9.45 10.15.	Reading.
10.15-10.30.	Dictated spelling.
10.30-10.45.	Recess.
10.45-11.20.	Arithmetic.
11.20-11.30.	Story.
11.30-12.00.	Manual work.

1.00- 1.12.	Music.
1.12- 1.30.	Writing.
1.30- 1.50.	Drawing.
1.50- 2.15.	Preparation of spelling.
2.15- 2.30.	Recess.
2.30- 3.00.	Manual work.

Developing the mind, the motor tone, and the physical health together, a great improvement may take place in the deficient child. Quickness and precision in muscular movements, a brighter face, better emotional control are just as evident as improved scholarship.

One must not expect too much of these children. Some pick up surprisingly under special instruction and are retransferred to the regular classes; the majority do better than they did in the regular grades, but still show inherent deficiency. Very few children of this kind can ever be taught to do fifth-grade work at any age. The unstable nervous organization of many of these children forbids the pushing of the instruction, lest an outburst of temper result and harm be done. But the children should not be coddled. The situation must be left to the common sense of the teacher, since no categorical rules and instructions can be formulated applicable to such a wide variety of cases.

I have seen hundreds of children in the special classes of the Philadelphia schools and in the Training School for the Feeble-minded at Vineland, and have visited two or three schools in New York City and Chicago. Those in New York City are under the direction of a supervisor, Miss Farrell, who taught the first established ungraded class in New York City. I take the opportunity to reproduce words of praise for the New York classes, written after actual observation, by Dr. C. E. Atwood (*New York Medical Journal*, Sept. 7, 1907).

"One of the best conducted of the ungraded classes which I visited was in Public School No. 18, on East Fifty-first Street. This was presided over by a teacher who has had the advantage of training in an excellent private school for the feeble-minded. The children are of the lowest grade. The day's programme, arranged by this teacher, subject to great variation, is somewhat as follows: From 9.00 to 11.45 A.M., and from 1.00 to 3.00 P.M., with appropriate intermissions, the children pursue various tasks calculated to train the senses and to develop them on the motor side. They dust and arrange the room; name objects in picture books, and learn about their attributes; sing songs; listen to a

story concerning which they make observations; study nature by means of a little garden, where potatoes, peas, lettuce, onions, etc., are planted by the pupils themselves in a rough box; carve simple shapes in wood; select and match colors; have simple gymnastics; test their smelling and tasting; pursue various games under instruction to aid in self-control and improve in precision of hand, eye, and ear; then there are exercises in drawing on the blackboard, counting with money, brush work with colors, modeling in clay, word pictures, Indian club and dumb-bell exercises, etc., the whole concluding with dancing and marching with piano accompaniment, special attention being given to the attitude, rhythmic body movements, and mannerly deportment.

"The ungraded classes of all the schools make occasional visits to museums, the aquarium, and zoölogical garden for objective teaching, and to Forest Hills and Bronx Park for field work. Materials from some of the museums are also loaned, so that the objects themselves may be seen and studied."

Another school designed for the vicious truant and incorrigible class was also visited. It will be noticed from the context that the majority of these children are mentally defective as well as depraved.

"Public School No. 120, on Broome Street, is a school entirely for incorrigible boys. Many are on parole from the courts in care of the principal, and others are sent by principals of other schools as incorrigibles, who would otherwise be either suspended or sent to the Truant School. They are incorrigible on account of either faulty home conditions or defective mentality. In the first class visited there were 15; one boy seen had two brothers who are professional thieves; one was defective and degenerate, 16 years old, with mentality of 6. They were mostly street boys with, as the principal expressed it, a superficial brightness. In this class the teacher selects some subject which becomes a center of interest. At the time of my visit the subject was "the farm," and everything that could be drawn on the board, thought of, made, etc., pertaining to a farm was brought up for discussion and treatment, and at once awakened marked interest. Several were cutting out birds from paper; one was weaving a basket in the shape of a bird's nest. Another had three baskets already made, etc. There is a gymnasium, and also a bath, in this school, as in the regular public schools. In one class two boys were working in leather. In the shop the lowest-grade boys were doing wood-carving and carpentry.

"There are nine classes in the school. Most of the pupils have no sense of right and wrong at the start. One, *e.g.*, before coming, had been learning to steal for a living, and thought it no harm. Ages run from 10 to 15 years. Punishment is only by deprivation. Pupils have to earn their privilege by good behavior. The boys are of suitable age for the grammar grades, but are only able to do the lowest primary work. Some learn to count by simple methods. Others put sentences together with separate printed words, each pupil being given a picture as topic.

Fig. 165.—Feeble-minded children in special classes.

"The school has been open two years. There are 135 pupils, drawn mostly from two school districts of the downtown East Side, representing ten schools, each of at least 2000 pupils. Ten or eleven parochial schools send a few, and some boys are picked off the streets. A great many of these incorrigible boys are here fitted for remunerative employment outside. Fifty-one out of a total of about 350 (or one-seventh) have been sent out; all but 6 have been heard from, and are doing well at unskilled labor, *e.g.*, as messenger boys, telegraph boys, and various employments in department stores and downtown business places."

The actual results obtained by the special classes should be demonstrated, in support of our contention for their establishment. A paper, "The Results Obtained by Special Classes for Defectives," published in *The Training School,* December, 1910 (Vineland, N. J.), by the writer, may be quoted:—

"The object of this paper is eminently practical, but it may have pedagogical as well as economic value, since the superior results shown here may well indicate generally superior teaching methods as well as teaching methods specifically for defective children.

"In the spring of 1910 the writer urged a friend, principal of one of the largest elementary schools of Philadelphia, to establish a special class in his building for the backward children of the neighborhood, who at the time were scattered through three schools. He replied, 'I am not sure that such a course is the best thing for these children. Children learn by contact from each other as well as by instruction from the teacher. Put a lot of these backward children together and they lose the stimulus of bright minds around them. Then possibly they fail to get *anything.* Some of these larger backward children are physiologically too old to be placed in daily contact with little ones. I would carry them along to the fourth grade with normal children and take a chance on the books.'

"Here was food for thought. This principal is one of the best in Philadelphia and he shows his good sense in asking for proof of the value of the special class. He was right. The published story of the wonderful improvement of a single child may signify so many different things that general conclusions cannot be drawn from it. Conversely this principal's attitude may have arisen from the fact that he has exceptionally able teachers in his elementary grades.

"Knowing well from my visits to the special schools that they are doing remarkable work in educating and reclaiming boys,—work that would be famous if Pestallozzi, or Froebel, or other celebrity were only here to endorse it,—the writer resolved to seize the first opportunity to demonstrate the value of the special class by a general statistical study of its results.

"This opportunity presented itself when the Committee for the Determination of Feeble-minded Children visited (then) Special School

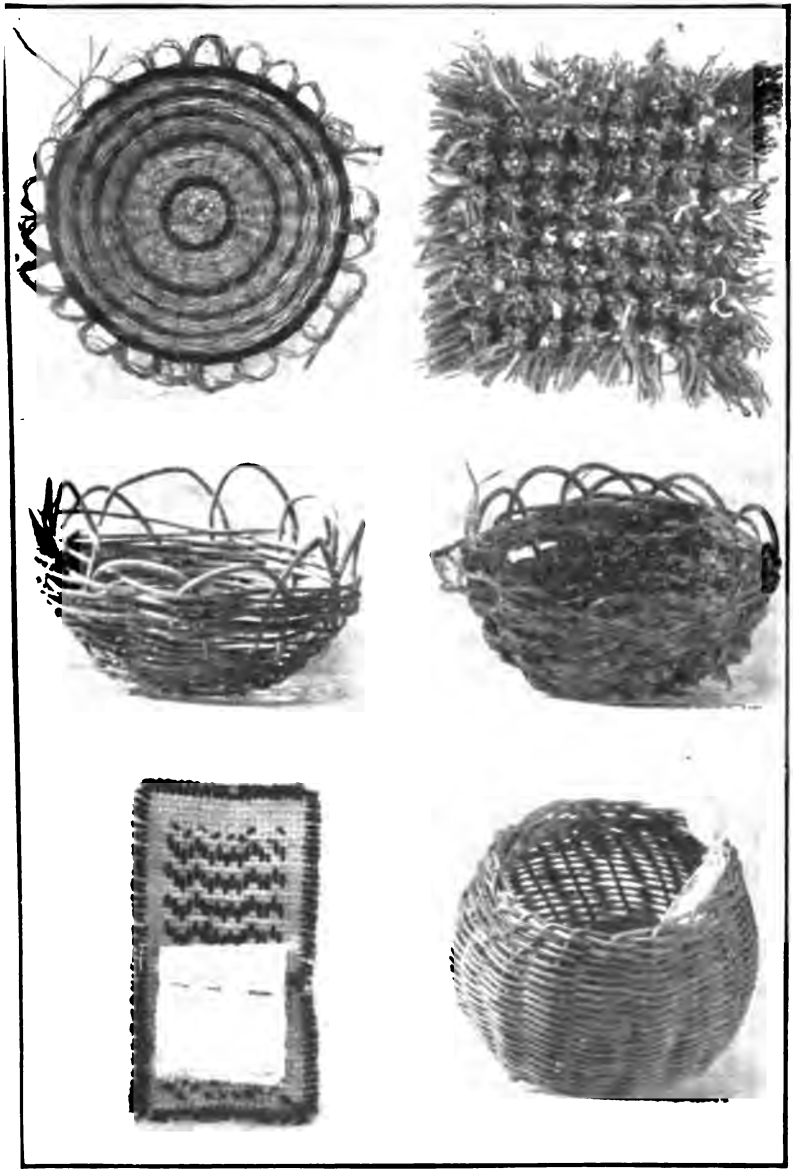


Fig. 166.—Mats and baskets made by feeble-minded children in special class. (Pupils of Miss M. H. Leech, New York Public Schools.)

No. 2, one of the best in the city. Here a blank chart was drawn up, and Miss Katharine Calwell, the principal, was asked to collect statistics showing the results obtained in her school. Miss Calwell's class being made up of disciplinary cases who stay only for comparatively short terms, we took up the matter with her assistant, Miss Jessie Myers, who willingly agreed to look up the records of her class.

"How much of the credit for the excellent work here demonstrated belongs to the special school system and how much personally to these two teachers, the writer does not know. The special school work makes teachers so interested in their boys that the two factors are really non-separable.

"The accompanying chart shows that the boys in Miss Myers's class progressed at 0.8054 (four-fifths) of the normal rate, while previously they had progressed at 0.3538 (one-third) of the normal rate. This difference which represents a doubling of the rate of progress was due to the influence of the special school and special class.

"It is not the purpose of this paper to analyze the causes of this great improvement in results obtained. It would weaken the force of this demonstration to leave the facts and wander into speculation and theory. It is necessary to point out, however, that this improvement in scholarship, while due in large part to good teaching and to shop work which holds the interest of the boys, is partly due to small classes, with individual attention and individual teaching, is partly due to a session extending from nine until two, which allows the newsboy to sell his papers and earn money without playing truant, and is partly due to the realization by the boys that further delinquency means a magistrate's court. Without reference to the comparative value of the regular and special school in teaching backward children, we do not wish it to be assumed from this chart that the special school is able to take a dull or backward boy and enable him to do the work of his proper grade. Remember that, although the children in this class *moved along* for the first time in their lives, nevertheless, their work here recorded is that of normal children three or four years younger than themselves."

Key to Chart.

The reader will easily understand the accompanying chart by noting the data referring to one case. In the Philadelphia schools there are eight elementary grades, each comprising a year's work and subdivided into half-grades.

In the first case, for instance, Philip entered the regular school class at the age of 6 years and stayed in the regular school six years, during which time he advanced but one grade. His rate of advance was therefore one-sixth of the normal rate. After transfer to the Special Class he accomplished two grades (two years' work) in two and a half years, his rate of advance now equaling two divided by two and a half, or four-fifths of the normal rate.

The two general averages in heavy type at the bottom of the chart are obtained by first reducing all the fractions in the columns above them to decimal figures (not shown on the chart) and then averaging the decimal figures.

	Regular School.						After Transfer to Special School No 2.													
NAME	Birth	Age entered	Grades accomplished	Time in R. S.	Rate of advance (grades per year)	Date of transfer	Feb. 1905	Sept. 1905	Feb. 1906	Sept. 1906	Feb. 1907	Sept. 1907	Feb. 1908	Sept. 1908	Feb. 1909	Sept. 1909	Feb. 1910	Grades accomplished	Time in S. S. No. 2	Rate of advance (grades per year)
Philip	2-23-96	6	1	6	.17	2-24-08							2a	2b	3a	3b	3b	2	2½	.80
Urban	5-2-96	6	1	7	.14	2-20-09									2a	2b	3a	1½	1½	1.00
Ralph	1-7-97	6	2	6	.33	6-1-09										3b	4a	1	1	1.00
William	5-10-96	7	2	5½	.36	11-16-08									3a	3b	3b	1	1½	.67
Edwin	9-28-94	6		2½		4-1-08	2a	2a	2a	2b	2b	2b	3a	3a	3b	4a	4b	4	7	.57
Roy	1-10-92					12-7-08									4a	4b	5a	1½	1½	1.00
Horace	1-24-97	6		3		2-06			1a	1a	1b	1b	2a	2a	2b	3a	3a	2½	4½	.55
John	12-18-98	6	½	3	.16	3-5-08							1b	2a 2b	3a	3b	4a	3	2½	1.25
Charles	11-1-96	6		3½		6-1-06			1a	1a	1b	1b	2a	2b	3a	3a	3b	3	4½	.67
George	9-8-96	6	½	6	.08	9-27-07						1b	2a	2b	3a	3b	4a	3	3	1.00
James	10-27-95	7	1	3	.33	2-5-06			2a	2a	2a	2b	2b	3a	3a	3b	3b	2	4½	.44
James	2-19-97	6		3		5-10-06				1a	1a	1b	1b	2a	2b	3a	3b	3	4	.75
David	11-9-97	6	2½	4½	.55	9-14-08								3b	3b	4a	4b	1½	2	.75
Harry	6-27-97	7	2½	5½	.46	11-23-09										3b	4a	1	1	1.00
Grant	5-15-99	6		3		9-8-08								1a	1b	2a 2b	3a	2½	2	1.25
Cloyse	5-26-94	6	1	5½	.09	3-27-06				2a	2b	2b	3a	3a	3b	3b	3b	2	4	.50
Frank	4-9-96	6		2½		12-15-04	1a	1a	1a	1b	1b	2a	2b	3a	3b	4a	4a	3½	5½	.64
Arthur	7-11-94	9	2	3½	.57	5-2-07						3a	3a	3b	3b	4a	4b	2	3	.67
Howard	1-1-98	6	½	3½	.14	11-17-07							1b	2a 2b	3a	3b	4a	3	2½	1.20
James	6-3-96	7	2	6	.33	4-8-09									3a	3a	3b	1	1½	.67
AVERAGE RATE OF ADVANCE					.3538 Grades per year															.8054 Grades per year

Chart showing better progress of dull pupils after transfer to a special class.

Administration of Special Classes.

Special classes have been established in most of our large cities during the last five years, and the future promises a great development of the field of special education.

Unfortunately at the present time the condition from the administrative standpoint is little better than chaos. This is primarily because the majority of superintendents and teachers have not kept abreast of the times, and, therefore, have the hazie t ideas on matters of health and of educational psychology. Theirs is not the blame, but rather the treadmill system which forgets the teacher while providing for the child, and allows the former to stagnate without the inspiration of postgraduate instruction.

Theoretically the special class is a great advance in education and is easily introduced into the schools with benefit alike to the deficient and the normal pupils. Practically the subjects of hygiene, medical inspection, compulsory education, and special education have been pushed into the schools without alteration of the curriculum to accommodate them, and without instruction of the teachers leading to their intelligent co-operation. Children have been transferred into special classes without expert advice and help; the teachers of these special classes have often been placed in charge of them, unwillingly, or without special preparation; the classes have been so large that they have resulted in disorderly aggregations rather than educational groups.

In order to bring definitely to the attention of the authorities the principal desiderata in this connection, the following have been formulated:—

1. Definite provision for health and special educational matters should be made in the school system, so that they will be considered by the teachers. If the ventilation of the room, the temperature, the children absent, the children unable to do the grade work, the children with defective vision and hearing, are to be within the teacher's province these should be ***duly observed and recorded,*** and a definite amount of time should be prescribed for this work. In other words the latter should receive the same consideration that spelling, geography, and history receive.

2. Supervising principals should be taught something of business management. It is fair to believe that if they were

paid commissions on promotions instead of salaries there would be something doing among the left-down children. The principal business of the supervising principal is really not to make out a monthly report, nor yet to tell the assistant teachers how to teach. It is to know why Johnny Jones was not promoted last term. For this knowledge card-index lists of the children, (*a*) by name; (*b*) by physical condition; (*c*) by home conditions; (*d*) by attendance, should be kept.

Fig. 167.—Woodwork of deficient children. Miss McFarland's class, Adams School, Philadelphia.

3. Normal school students should receive instruction in the subjects of practical hygiene and medical inspection.

4. Postgraduate instruction to all teachers graduating prior to the year 1905 should also be given.

5. Supervisors of special classes should be chosen with care.

6. Teachers of special classes should receive some special training.

7. The salaries of such teachers should be equal to the best salaries of grade teachers. Not more, because then a rush of political favorites will ensue. Aside from proper salaries, the

positions should be made attractive by weekly meetings for conference on the work. The afternoon devoted to this meeting, the classes can be looked after by the instructor in physical education, music, and manual training.

8. Truant, troublesome boys should not be put in the same special class with children who are deficient, but innocent. Such action is almost criminal, since the bad boys may teach the others immoral practices. These two groups are essentially different and should be handled from an entirely different standpoint. Their only resemblance is the poor scholarship of their members.

9. Special classes should be accommodated in average quarters. At the present time it is the custom to make use of the oldest, dirtiest, darkest room and furniture at hand. It is small wonder after the special class has been made disreputable by the school authorities that the children and parents recognize the fact, and competent teachers refuse to take up the work. Not that I advocate the other extreme, for the special class is expensive, and, therefore, should not be made a popular toy. It should have accommodation of average kind.

10. There should be a system of special classes averaging at least one class to every two thousand school population. The exact number of classes should, of course, depend upon local conditions, but a map of the city, with the locations of the special classes shown upon it, should reveal no glaring lack of facilities in any neighborhood.

11. There should be a definite system of transfer to and from special classes. It is often difficult to get a child in. Unfortunately it is just as difficult, because nobody cares, to get a child *out*. Sometimes the special class teacher is helpless in this matter; sometimes she is inclined to hold the useful children and those who make the best showing. No special class should exist without personal knowledge of the condition and progress of every child by the school principal.

12. The children in the special class should receive a careful medical examination. This, if possible, should be done by an expert in the subject of mental deficiency. When there are enough deficient children to allow the separation of the actually feeble-minded from the dull and backward, this should be done, for feeble-minded children are a heavy drag upon the others and

unfortunately lower the tone of the class by reason of their appearance and actions. However, no child should be placed in a "feeble-minded class" without previous examination and diagnosis by a physician. This is a legal protection as well as an act of justice. Such a physician should be an expert if such is obtainable.

Every feeble-minded child should be registered both at the principal's office and at the central office. These children are accommodated by the school system because this is better than the alternative of turning them out upon the street. So long as

Fig. 168.—School gardens of mentally deficient children, Cleveland, Ohio. (Courtesy of Miss Louise Klein Miller.)

the school system cares for them it should make every effort to demonstrate the number of these cases, and also make every effort to have them transferred to institutions for the feeble-minded.

13. The special classes for truant and troublesome boys constitute a proposition entirely different from the classes for deficient children just discussed. The work is here primarily discipline—punishment, to put it plainly. The unthinking reader who objects to this statement and claims that these boys are often misunderstood misses the principal point that they have arrived at the age of reason, and know the difference between right and wrong. The punishment primarily should consist simply in attending a (special) school located at a considerable distance from home, say ten or fifteen blocks. This involves no

real hardship and, indeed, does the boy a deal of good because it takes the edge off the animal spirits and the nervous irritability, which are characteristic of him. If under his new surroundings the boy behaves himself for a certain period of time, say two months, he should be returned to a regular school. This opportunity to get out of the truant school should be known to every boy as a right which he possesses, and the teacher should talk to him about the matter and urge him to get back among normal children. If he does not care for the school from which he was transferred, he should be allowed to go to another which appears to be reasonably located.

On the other hand, the truant boy should understand definitely that transfer to the truant school is the first of a series of possible legal steps, the others being a parental school (a semi-reformatory, such as the Training School for Boys at Glen Mills, Penna.), an actual reformatory for young men with prison discipline, and actual prison. The *raison d'être* for the special school is the merciful interposition of some agency between the public school and the jail, and the quicker the boy realizes this, the better for him. I am sorry to say that many of our special schools for bad boys relieve the regular school principal, but do little good to the boy himself. Continued truancy is not punished by heavy parental fine as it should be; about half the school day is spent in pleasant shop work, which means mental loafing for half the boys; the school maintains sessions from nine until two, so that the bad boy can get out and sell newspapers over an hour ahead of the good boy in the regular school.

It must be acknowledged that the boys are happier in the special school because they are treated better, because they are no longer inferior to their class mates in clothes and scholarship, and because they enjoy the industrial work, which they are better able to do than intellectual work.

It should never be forgotten that, while these boys are, *as a class*, of inferior intellectual ability and often of poor heredity, they are, nevertheless, not feeble-minded. The principal cause of their truancy and delinquency is lack of home training, and the principal aim of the truant school should be to provide the latter.

THE SKELETON.

(*Orthopedic Defects.*)

The word orthopedic refers to the bones and joints. The derivation of the word is misleading, for it originally meant "right child" (*i.e.,* normal child), and not "right foot" (normal foot) as one might suppose. The fact that foot deformities exist is only a coincidence.

THE CAUSES OF ORTHOPEDIC DEFECTS.

Most deformities of the skeleton are acquired while the bones are young, soft, and yielding. The gradual hardening of the bones with age perpetuates the deformities.

The principal causes of deformities are:—

1. Unnatural softness of the bones—due to rickets.
2. Habitual faulty position—from daily occupation, fatigue of the back muscles, general weakness, defective eyesight, defective hearing, insufficient respiratory exercise.
3. Tubercular disease of the bones and joints.
4. Paralysis of limbs.
5. Violent accidents.

If the indirect causes of orthopedic deformities be reviewed, the most potent appear to be:—

Adenoid nasal obstruction, which, by reason of defective hearing, poor nutrition, and insufficient respiratory exercise, produces stoop shoulders, flat chest and high, narrow palate.

Bad school ventilation, ill-sized school furniture, and long school periods, which producing fatigue and faulty positions, produce flat chest, stoop shoulders, and lateral spinal curvature.

Rickets, which causes unnaturally soft, yielding bones. Rachitic deformities, however, appear before the beginning of school life. A square, box-shaped skull, pigeon breast, contracted pelvis, and bow-legs are the most frequent of its resulting deformities.

PRINCIPAL ORTHOPEDIC DEFECTS.

By far the most important orthopedic defects are stoop shoulders and flat chest, and lateral spinal curvature. A dozen, however, may well be considered. Proceeding from the head down, they are:—

Large Skull.

A skull slightly larger than the average is likely to denote high mental development, so that one must be careful not to

Fig. 169.—Square head caused by rickets (simulating hydrocephalus). (From *Fischer*.)

commit a bad error of judgment. A rather large skull, with square, bulging forehead, is a frequent effect of rickets in infancy. Many such cases may be seen among one's acquaintances. The mind is not in the least affected by the peculiar skull shape. The accompanying illustration shows such a skull in profile view.

A large skull, globular in shape, is caused by hydrocephalus (the word means water on the brain or watery brain). In such

cases some dropsical or inflammatory obstruction of the brain circulation causes swelling of the brain like a blown-up balloon.[1] This event must take place before birth or in very early infancy, while the cranial bones are still soft and yielding. A skull that measures over 22 inches in circumference is beyond normal size.

Small Skull.

A very small skull (less than 18 inches circumference) is termed microcephalus. It is the result of the small brain inside —not the cause. This is proven by operations on microcephalic children, in which the vault of the skull was separated from the base by trephining and sawing, with no subsequent enlargement of the head nor improvement in the mentality. Barr's book on Mental Defectives gives a number of photographs showing boys who had been so operated upon.

Microcephalic children are feeble-minded because of the lack of brain, particularly the front lobes of the cerebrum. Inspection of such cases shows that the forehead is usually very low and retreating, giving the vertex a conical pointed appearance and making the scalp to begin just above the eyes (see page 365).

High, Narrow Palate.

This has been already considered in the chapters on the teeth and nose and throat. It is caused by nasal obstruction, which first causes a narrow upper jaw and then the high palate because the latter pushes upward. The treatment is the removal of the adenoids and mechanical regulation of the dental arches by a mechanical dentist. (See Orthodontia.)

Wryneck.

This is usually due to temporary inflammation of the neck muscles—usually one of the sternomastoid muscles. Occasionally tuberculous disease of the spine in the neck region causes wryneck by irritation of the spinal nerves. In chronic cases, slowly growing worse, this should be borne in mind.

[1] This usually occurs before birth and prohibits the delivery of the child alive. Hydrocephalic persons, if they survive, are feeble-minded.

Stoop Shoulders and Flat Chest.

This is the most frequent and the most important of orthopedic defects.

Its causes are numerous. They may be thus set down:—

a. Nasal obstruction by adenoid growths. Semi-asphyxiation and languor are succeeded by poor nutrition, nervous

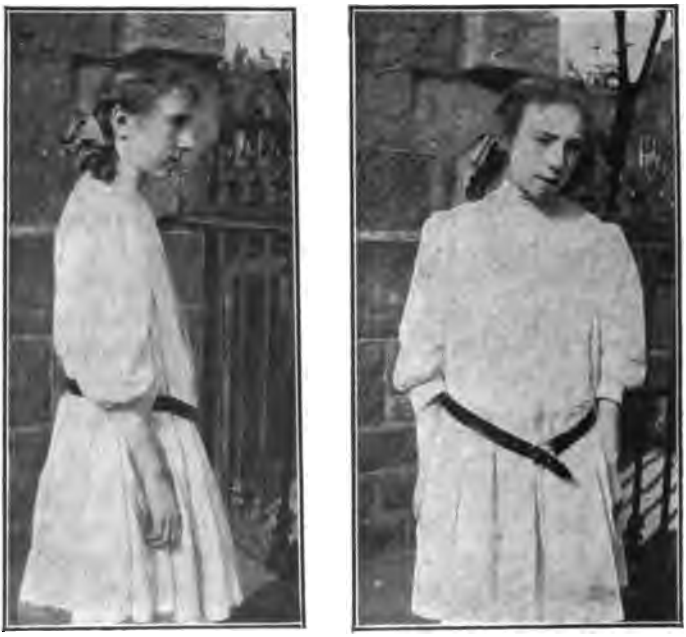


Fig. 170.—Flat chest and stoop shoulders (also poor nutrition).

exhaustion and defective hearing. Stoop shoulders are very characteristic of children with adenoids. (See Fig. 118.)

b. Improper school furniture—ill-fitting desks and seats which fatigue the muscles of the back by forcing extreme positions during school hours.

c. Long school sessions. The back muscles here become exhausted because one set of back muscles, without relief by the others, is required to hold the body erect for an hour or more. Naturally the various layers or sets of back muscles take turns

at working,—the individual shifting his position slightly from time to time. (See chapter on School Hygiene,—School Furniture and Physical Education.)

d. General weakness. This may result from poor nutrition, nervous exhaustion and anemia. Frequently they coexist.

Fig. 171.—Stoop shoulders (and lateral curvature). Cause, defective vision. Age only 9 years. See also Fig. 118, showing stoop shoulders from adenoids.

Fig. 172.—Stoop shoulders and flat chest.

e. Defective hearing or defective vision, because of which the child leans forward to hear or to see.

The prevalence of stoop shoulders and flat chest is amazing. Probably 10 per cent. of all children show it in evident degree. In adult life this proportion is increased by the following of clerical occupations, dentistry, tailoring, and baggage handling (porters).

Stoop shoulders is more common among girls than among

boys. Probably the majority of girls wearing eye-glasses are stoop shouldered—because of early neglect to procure the glasses.

The evidence and diagnosis of stoop shoulders are plain and easy. The only possible mistake is to confuse the condition with tuberculous spinal disease, discussed later.

The effects of stoop shoulders and flat chest are several and important. Consumption, of course, is the most dreaded. The flat chest of the consumptive is proverbial. A general lack of vigor is characteristic of flat-chested persons, because of poor nutrition from poor air supply. Personal appearance should

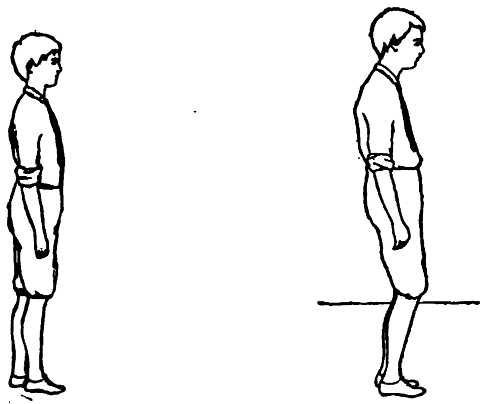


Fig. 173.—Illustrating correct and incorrect postures.

surely be mentioned as a factor of success, and the flat-chested, forceless individual starts out with a big handicap compared with his high-chested, manly, vigorous-appearing neighbor. It creates an impression of social inferiority also, since more intelligent parents do not allow their children to grow up so neglected. By the way, the private schools for boys take care to emphasize and accentuate this very distinction by employing physical instructors to produce healthy, well-appearing lads. The public high schools may provide a more solid education than private schools, but in this most important respect they are far behind.

The treatment of flat chest and stoop shoulders divides itself into (*a*) the removal of the cause, and (*b*) corrective exercises.

The removal of the cause means removal of adenoids, the procurement of eye-glasses, the proper seating of near-sighted

and deaf children, and better nutrition of sickly children. It also means a revolution in our school buildings, school furniture, and school curriculum. These have been discussed so extensively already, however, that they must be omitted from consideration here. (See School Hygiene and Nervous Children.)

Corrective exercises should be simple in character and few in number, so that the child can easily learn them and practise them at home. This principle cannot be too strongly emphasized. Some simple apparatus, however, such as wands made from broomsticks, will serve to make the child realize that the matter is a serious one instead of a game. Three exercises without any apparatus may be suggested. In the first the child is induced to throw his shoulders back by asking him to allow his arms to hang down with the palms of the hands turned forward so that they even face a little outward. The little fingers should be pressed lightly against the sides of the thighs. The result is a marked squaring of the shoulders, although with awkward effect. A child so taught, with the added remark that "the soldiers all do this," will usually go away proud of his supposedly martial appearance and determined to practise the drill. The writer has personal knowledge of a small boy with a tendency to stoop shoulders who was "straightened up" incidentally by the father of one of his boy friends. This little helpful act gave him the resolve which he ever after practised, to walk and carry himself in a proper upright manner.

Two other exercises for the correction of stoop shoulders and flat chest are quoted from memory from Dr. MacKenzie's book on physical education. The simpler one consists in first throwing back the head, with the chin, however, kept well down, and then successively placing one hand in front of the chest and inflating the chest cavity sufficiently to have it touch the hand. During all this the abdomen should be kept pushed out by slight abdominal expiration also,—a feat which requires a little practice. It should be remembered that true increase of chest capacity is obtained only by the simultaneous depression of the floor and raising of the walls of the chest. The other exercise is an elaboration of the one just described. The child is instructed to successively throw back the head, draw down the chin, breathe in deeply (holding this air), raise the arms above

the head until the hands touch, and finally breathe in as much more air as possible, rising up on the toes to reinforce the effort. This exercise should be done with the diaphragm simultaneously pushed down as in the preceding exercise.

The complete cure of a marked case of stoop shoulders in a well-grown, older child is practically impossible because of the natural hardening of the bones in their improper positions. Nevertheless vigorous exercises conscientiously pursued will cause a marked improvement in any case. A good exercise for straightening out the curved spine of round shoulders is to lean backward on a large quarter-circle curved board, about 5 feet high (*i.e.*, 5 feet radius). This accomplishes overextension of the spine with a good stretching of the ligaments. The best results in pronounced cases are of course obtained after consultation with an orthopedic specialist and recourse to special gymnastic apparatus.

Lateral Curvature of the Spine.

(*Scoliosis.*)

This is second in frequency of the orthopedic defects. Possibly if the cases of slight degree are included it exceeds stoop shoulders in its prevalence.

The causes of lateral curvature are many. It may be directly caused by standing or sitting in a faulty position, or by the exercise of only one side of the body, or it may be secondary to some defect which has tended to change the center of equilibrium of the body.

Most cases of lateral curvature are primary in causation, and due to faults in our school system.[1] Dr. H. Schwatt (*International Clinics*, vol. ii, twentieth series) says:—

"Kocher has called lateral curvature a school disease. Eulenberg's statistics of 1000 cases show that 88.7 per cent. developed the deformity between the sixth and fourteenth years, and Whitman reports 201 cases in 130 of which the deformity was first discovered between the sixth and fifteenth years. School

---

[1] One writer, Muskat, disagrees with this view, believing the most cases originate before school life. (*Journal of the American Medical Association*, Jan. 2, 1909.) The writer's belief is that of the great majority—that school life is responsible for most cases.

life as an influence in the development of lateral curvature was established in 71.25 per cent. of 400 cases of scoliosis under treatment at the Hospital for the Crippled and Ruptured."

While desks and seats of the wrong size and also a twisted position while writing may contribute, the principal cause of lateral curvature appears to be fatigue of the back muscles from over-long school periods. The child collapses upon the desk and seeks support on his elbow. I have endeavored to emphasize in this chapter, in the chapter on nervous disorders, and in the section on hygiene, the necessity of amending our school curriculum so that frequent periods of bodily freedom and relief are provided.

The habitual carrying of books by one arm may produce lateral curvature, and Superintendent Maxwell, of New York City, some years ago issued instructions for the children to carry their books in alternate hands on alternate days. The reader will remember in "Ben Hur" that the latter asked permission to row on the starboard and port sides of the galley alternately because he noticed the one-sided development of his fellow galley slaves.

Some cases of curvature do arise in infancy without doubt. Photographs of such may be found in medical journals and textbooks.[1] Possibly dragging an infant around by a pulled-up arm and shoulder, as ignorant mothers do, may cause the deformity also. More likely it is the habitual carrying of the infant over the same shoulder.

As to secondary causes, head tilting from astigmatism (see page 219), dislocation of the hip, tuberculous hip disease, a paralyzed lower limb, or any condition throwing the body out of normal equilibrium, will produce a compensatory curve in the spine in order to regain this equilibrium. Such cases are among the most pronounced in degree.

The prevalence of lateral curvature is difficult to state categorically because there are so many cases of very slight degree, and because the clothing conceals the majority of cases. Probably 5 per cent. of school children show it in noticeable degree, while a total of 25 per cent. for all cases is no exaggera-

---

[1] See case reported by Dr. H. C. Carpenter, *Journal of the American Medical Association*, April 22, 1905.

2

1

Fig. 174.—Lateral spinal curvature. 1, with the arms hanging; 2, with the arms folded. (From *Fischer*.)

tion. Thus MacKenzie, after careful examination, found lateral curvature existing in 23 per cent. of high-school boys, 12 per cent. of the students of Magill University, and 27 per cent. of the students of the Royal Victoria College for Women.

These figures are corroborated by European investigators (see page 598), who undress children and examine them more thoroughly than is allowed by the American authorities. The prevalence of curvature among adults will be testified to by every tailor, who is compelled to pad one shoulder of a large proportion of the coats he makes in order to produce a good appearance of his customers.

Evidence of Lateral Curvature.

To bring out the degree of curvature, if it exists, the child should be undressed to the waist. The spines of the vertebræ should be lightly felt by the finger and then marked with ink or a soft crayon. The levels of the shoulders should next be compared, and then the levels of the shoulder-blades. Under the lower shoulder a wider space is seen between the body and the arm as it hangs down.

The child should then be told to lean forward from the hips, until the trunk is horizontal. In this position any notation of the vertebræ is evident as a hump on one side of the midline.

Degrees and Types of Curvature.—The principal curve is in the dorsal region and may be the only one. There may be, however, a compensatory curve, or there may be two compensatory curves, one above and one below. The compensatory curves keep the body balanced so that it does not topple and tend to fall over sidewise. The general curvature (that one most apparent and found in the thoracic region) is to the left in nine-tenths of all cases. The right shoulder is then lower than the left shoulder.

Further description cannot well be given without classifying cases of lateral curvature into the beginning (or "functional" or "postural") type and the final (or "structural" or "organic") type. In the first the curvature has not long existed—usually the subject is youthful—and the bones, ligaments and cartilages are not yet affected. In the second the curvature has existed long enough to cause yielding of the bones, cartilages and ligaments.

In the beginning or functional type, the curve is a single sweep. In the usual case, where the curve is toward the left, it will be found, if the subject leans forward until the back is horizontal, that the spine is so twisted that the right shoulder

Fig. 175.—Lateral spinal curvature; right shoulder is high. See also Fig. 184.

is carried backward and is the more prominent, and also that the whole right back is a little more prominent. On the other hand, if the curvature is an old one which has become fixed, it may gradually develop compensatory curves above and below the dorsal curve. Furthermore an old or structural curvature presents the opposite rotation of the vertebræ to that of a beginning curvature—the person with the usual left thoracic curve will now show the *left shoulder and left back* prominent when he leans well forward. It is true that this is a detail, but it may lead the

examiner to overlook the existence of the curvature in a case which is passing over from the "beginning to the final" type. In such a transitional case there is no prominence of either shoulder when the subject leans forward for the inspection of his back by the examiner.

The Treatment of Lateral Curvature.—This consists in (*a*) the removal of the cause, (*b*) in the institution of mobilizing and strengthening exercises, (*c*) in improvement of the general health, and (*d*) in specific corrective exercises. These may be used singly or in combination according to the case.

The removal of the cause signifies shorter school study periods, proper seats and desks, the procurement of needed eye-glasses and the procurement of special shoes for shortened, paralyzed limbs.

The principle of exercise for a weak back, rather than the use of a brace, is parallel with the exercise of a weak ankle rather than the use of a high shoe. Exercise strengthens; a splint, long used, weakens a part.

The treatment of beginning or "functional" cases consists of simple exercises and requires only persistence. The spinal column is loosened up and made flexible by bending, twisting and hanging exercises, and then a permanent proper position is secured by vigorous setting-up exercises, such as are given to all children by physical instructors. The loosening-up exercises may be directed indiscriminately at both sides of the body except where the curvature is marked, in which case the child should be instructed to bend mostly toward the curved side, and to hang from rings of unequal level (in order to pull up the lowered shoulder).

The correct position should be maintained by general invigorating exercises, developing the back muscles. Walking with an object balanced upon the head develops body symmetry.

The treatment of final or "structural" curvature requires the long-continued services of a specialist and the use of formal apparatus. The stiffened joints must be loosened up, the weakened muscles developed, and the contracted ligaments stretched. In addition to the exercises already described, which will do fairly well for the minor cases, orthopedic surgeons use several other measures of more specific purpose. The German Zander

apparatus provides opportunity for the exercise of isolated sets of muscles. More formidable than this are the apparatuses designed to forcibly straighten the spine and hold it there for a period. Stretching of the spine by suspension from a head sling, side-pulling on the convex curves of the chest by pads and canvas bands while the patient is secured in a frame, and plaster-of-Paris casts, worn ten days and renewed, are the most used.

Fig. 176.—Pigeon breast.

Fig. 177.—Bony deformities caused by rickets in infancy. Note the depression in the breast bone and the broad, shallow groove around the chest ("Harrison's groove"). (From *Fischer.*)

Pigeon Breast.

Pigeon breast is usually caused by rickets in infancy. While the breast-bone, like the other bones, may be directly enlarged by this disease, the principal factor is the ***sucking in*** of the side chest wall of the catarrhal infant during the act of inspiration. Although the prominence is noticeable, the capacity of the chest is actually decreased.

A broad, shallow groove (Harrison's groove), seen on the front and sides of the chest at its lower part, is another result of rickets. It is caused in much the same manner that pigeon breast is caused. The diaphragm, made taut and drawn down during inspiration, pulls inward at its attachments and the soft, rickety ribs yield.

Fig. 178.—Tuberculosis of spine, showing partial destruction of two vertebræ and resulting angular deformity. (From *Fischer.*)

Tuberculosis of the Spine (Pott's Disease).

This disease in its active stage is not likely to come before the school physician or teacher, since half of all cases begin between 3 and 5 years of age. The writer, however, discovered a little girl in a Philadelphia public school who showed at the base of the neck the characteristic deformity. She stated that she had suffered pain at night in the neck for the last three years. If "recovery" (which signifies arrest of the disease with more or less damage) takes place the child presents the characteristic hunchback deformity. (See illustration.)

If, on the other hand, the bone destruction progresses and chronic discharging abscess ensues, the little sufferer becomes a long time hospital or sanitarium patient, confined in a plaster cast or brace. About 25 per cent. of cases progress to abscess.

Fig. 179.—Tuberculosis of the spine. (From *Fischer*.)

The disease should be distinguished from ordinary stoop shoulders by the fact that the diseased spine presents a sharp, angular projection, by the pain and tenderness which causes muscular rigidity so that the child turns his head stiffly or leans over stiffly as the case may be, and by the pains at night which cause sleep broken by occasional sharp cries of pain. Any child suspected of tuberculous spine disease should be referred at once to a qualified physician.

Flat, Contracted Pelvis.

Flat, contracted pelvis occurs frequently among girls and women of the poorer classes. The danger to its feminine possessor, should she bear children, should cause physicians and laity alike to combat any influence which will tend to produce it. During later school life the girl may encounter feminine fashions which dictate that the waist or pelvis shall be squeezed into abnormal confines. Such practices should not be tolerated.

Unfortunately the principal cause of contracted pelvis, rickets, acts in early life. The sacrum, under the weight of the spine, sinks downward and forward into the pelvic cavity.

Tuberculosis of the Hip-joint.

Here we have the same slow onset, pain, tenderness, and rigidity of the part, and frequent ultimate tissue destruction with abscess, which have been already noted in the description of tubercular spinal disease. The disease usually develops between the fifth and tenth years, and is often early looked upon as "rheumatism." Particularly may it be looked upon as rheumatism of the knee-joint, because the pain is frequently referred there reflexly instead of the hip.

If the child be seen in school after treatment and arrest of the disease, the diagnosis can be made from infantile paralysis affecting the limb by reason of the stiffness of the joint, the usual facial expression indicative of suffering, and the statement of the child himself.

Bow-legs and Knock-knees.

Bow-legs are due to the yielding of the bones under the weight of the body. It originates in early childhood (possibly), sometimes in healthy children who have been allowed to walk too early, but usually in rickety children whose bones are abnormally soft. For this reason it is particularly common among the negroes and Italians of our large cities. Treatment of mild cases in young children consists in drawing the knees together by a canvas band or a towel, a soft pad first being placed between the ankles. Long-standing cases and pronounced cases require the attention of a surgeon.

Knock-knees are caused in the same manner as bow-legs, except that the legs bend inward. Bow-legs, however, are much the more common. A tendency to knock-knees is often seen in tall, delicate children, whose weak leg muscles and knee ligaments yield readily. Such children walk flat-footed, with the feet turned toes outward.

Paralyzed Limbs.

Paralysis of a part is usually due to infantile paralysis of the *spinal type*. Much more rarely is it due to cerebral paralysis of childhood. These diseases are described in the chapter on the nervous system.

In the case of infantile *spinal* paralysis, either the upper limb or the lower limb may be affected, entirely or in part. The accompanying illustrations show paralyses affecting (*a*) an entire limb, (*b*) the fibular muscles only, with a consequent weakness of the ankle on the outer side. The rather familiar *club-foot* is due to contractures of the paralyzed leg and foot muscles. Examination of the paralyzed part shows it to be cold and bluish—evidently possessing a sluggish, congested circulation. The tendon reflexes are lost. The mind is not affected. Treatment is of little value, since the nerve centers affected are destroyed. Massage, tonic medicines and electricity are the usual measures. In a few cases, surgeons have transplanted nerves and tendons, with considerable improvement in the motion of the limb.

See Figs. 138, 139.

Paralysis of *cerebral origin* usually results from injury of the head at birth. It affects an entire side of the body, sometimes including the face. In the worst cases both sides are affected. The paralyzed parts are rigid and the tendon reflexes increased. The child is almost always feeble-minded, sometimes of low idiot grade. Chorea, stuttering, emotional outbreaks, and other nervous disorders are frequently present. There is no treatment.

See Figs. 140, 141.

NUTRITION.

Nutrition is almost synonymous with the term "general health." It is a vital subject, for faulty metabolism, like a damaged heart or diseased kidneys, may lead to death.

In this chapter consideration will be given to poor nutrition only as it occurs in children of school age.

THE CAUSES OF POOR NUTRITION.

The causes of poor nutrition are basically three, and these are just the opposite of the three primary rules of hygiene which are good food, good air, and proper rest. To these may be added secondary causes such as infections (tuberculosis principally) and organic disease (*e.g.*, of the kidneys or liver).

Poor food has a variety of meanings. The food may be insufficient and the child half starved. It may be improperly cooked—the frying pan has ruined thousands of stomachs. It may be cheap, coarse food like that used by the immigrants from southern Europe, brown bread without butter, little meat except the cheapest fish, no milk, and no green vegetables half the year. It may consist partly of coffee, which is no food at all and in the same class with tobacco as a drug to the nervous system. Among the poor Germans rye bread, cheese, bologna sausage, and beer are staple articles for children. The food may be eaten hastily, entailing indigestion because it is not chewed into small particles, not mixed well with saliva for starch digestion, and not productive of the flow of gastric juice, which is secured by chewing and enjoyment. Lack of variety in the food depresses the appetite. Irregular meals, overloading, and excess of one article are also harmful.

Indigestion may be included in this connection, since undigested food is hardly food at all. Adenoids, nasal catarrh, and decayed teeth may produce this indigestion. Nervous worry, which in adults is the most fruitful cause of indigestion, does not produce severe dyspepsia in children, although it does lower the nutrition powerfully in some manner.

An interesting investigation into the school child's breakfast was made in Philadelphia, by Dr. W. C. Hollopeter, and published by him in the *Journal of the American Medical Association*, November 20, 1909. After reviewing the investigations of Mr. John Spargo, who reported that of 12,800 children

Fig. 180.—Poor nutrition (sisters). These cases are typical of those seen in the poor foreign quarters—not emaciated, but tissues flabby and weak.

inquired into, 2950, or more than 23 per cent., had either a very inadequate breakfast or no breakfast at all, Dr. Hollopeter says:—

For several years I have been deeply interested in the child's breakfast, and I have made careful investigation along this line to learn the actual truth. A large proportion of the children, if asked why they did not have breakfast, would quickly reply that they did not want it, or, if in the younger children, the answer would be that their mothers could not make them take any. The true answer must be sought farther back than the mere lack of food, for food is frequently

abundant. The true cause is generally the personal or domiciliary hygiene of the poorer classes extending throughout several generations. Careless mother, unclean bedrooms close and badly ventilated, late retiring hours, with heavy, unsuitable dinners, a strong disinclination for the morning bath—all tend to cause neglect of the morning meal; then the child is hurried off to school with little attention to his personal comfort in many ways, besides omitting the breakfast.

It is not among the poorer classes alone that we find the capricious morning appetite. The fault is found just as frequently among the children of the better classes. This condition prevails in a more pronounced form—the personal environment is forced and unnatural. The practice of allowing young children tea and coffee, various stimulants, the rich, late, evening meals, associated with the excitement of music and visitors until the early sleeping hours have been broken, are all active factors in producing unstable appetites. These conditions and many more could be mentioned which must be taken into account when seeking a remedy for the growing evil. Little good can be accomplished in spending public money for free meals for children who do not want to eat and cannot eat in the early morning, handicapped as they are with these many difficulties.

With the object of corroborating or disproving the correctness of Robert Hunter's and John Spargo's statements of the school child's breakfast, I enlisted the services during the winter of about 100 teachers in the elementary schools and emphasized the importance of their method of questioning the young child. I insisted that the following three questions be asked: 1. Do you eat a breakfast? 2. What do you eat? 3. How long does it take you to eat? The importance of truthfulness in our answers would rest in the manner of the teacher's approach to the child. She must ask each child alone and in strict confidence; the child must not know he was about to be questioned; otherwise, the answer would be prompted by his pride or his mother's suggestion—that is one reason why the answers collected by John Spargo are misleading.

The result of my winter's work is very briefly summarized as follows:—

Of 2169 children interrogated:—

58 per cent. drank coffee	40 per cent. ate eggs
15 per cent. drank milk	35 per cent. ate a cereal
11 per cent. drank cocoa	5 per cent. ate potatoes
11 per cent. drank tea	18 per cent. ate cakes
68 per cent. ate bread	9 per cent. ate meat
4 per cent. ate rolls	9 per cent. ate fruit

6 per cent. ate various other foods

Only 6 claimed to eat no breakfast; 737 gave the time consumed in eating as follows:—

2, 50 minutes	1, 13 minutes
5, 45 minutes	2, 12 minutes
3, 35 minutes	135, 10 minutes
74, 30 minutes	1, 8 minutes
27, 25 minutes	31, 5 minutes
128, 20 minutes	3, 5 minutes
221, 15 minutes	2, 2 minutes
2, 1 minute.	

In conclusion, while we cannot draw a definite result from the analysis of so small a number of school children (2169) as to the quantity and quality of food taken for their breakfasts, we may infer that the school child has a chance—a poor one, indeed—for a breakfast, and the reason he has so poor a one is not that he has no food, but unfortunate surroundings to prepare him for his day's work.

A similar investigation of school children's breakfasts was made by Dr. E. Mather Sill,[1] of New York City. He says:—

"From a study of the meals of 210 malnourished children, I found that the following breakfasts were given:—

Tea or coffee and bread	165
Cocoa or milk and bread	30
Milk or tea and egg	10
Coffee and oatmeal	4
Nothing	1

"It is well known that breakfast is the important meal for the growing child.

"Dr. H. M. Lechstrecker, of the New York State Board of Charities, examined 10,707 children in industrial schools of New York, with the following result: 998 had coffee or coffee and bread only for breakfast; 439 had no breakfast; 998 were anemic owing to lack of nourishment. Only 1855, or 17.32 per cent., started the day with an adequate meal."

In the report of the New York School Lunch Committee, presented on the following pages, further evidence of the scanty breakfast of the poor child is given. (See also the section on School Feeding, page 100.)

Dr. Sill, in the article just quoted, gives the results of his

[1] "Dietary Studies of Undernourished School Children in New York City," E. Mather Sill, M.D., Jour. Amer. Med. Assoc., Nov. 26, 1910.

investigation of the diet in families where poorly nourished school children existed. In 34 such families in a poor city district he found that the poor nutrition was attributable in 28 families to insufficient food, while in 6 families the cause lay elsewhere. After commenting on similar investigations by others on the dietaries of the poor, which show that the laboring class consume less food than that required for efficient work, Dr. Sill[1] says:—

Dietary studies were made from 34 families of the poorer classes, living on the lower "East Side" of New York City, below Fourteenth Street, and east of Third Avenue and the Bowery. They were representative of the people in this district and a large number of occupations were represented. Some were found to be shiftless and slovenly and took no interest in having a clean, comfortable home and setting an attractive table, while others, though ignorant, were willing and desirous of learning how they could improve their way of living and dietaries.

The range in total income per family was from an amount not sufficient to buy the absolute necessities of life to an amount which should be ample for their needs and equal to that on which other families have been found to live comfortably. In no case among poorer families was there any food used which required care or work in preparing.

In the 34 dietary studies made, 28 dietaries were found to be deficient in protein, fat, and carbohydrates, with a corresponding low fuel value per man per day, and by multiplying these results by the factor used according to the ages of the undernourished child we obtain a diet correspondingly low for it.

The average of these 28 dietaries showed the following per man per day (all the families having malnourished children):—

Cost 19 cents, protein 95 Gm., fat 68 Gm., carbohydrates 407 Gm., calories 2614. These all did active or moderately active work.

Some 6 of these dietaries were up to or above the recognized standards. Here there were always other good and sufficient reasons for the malnutrition of the children, such as close quarters, overcrowding, late hours, infrequent bathing, eating candy between meals, and tuberculous infection, or convalescence from disease; also adenoids and enlarged tonsils in some cases, or organic disease.

Dietary studies of the 6 fairly well-to-do families, at moderately active muscular work, showed averages per man per day as follows:—

Cost 35 cents, protein 149 Gm., fat 115 Gm., carbohydrates 569 Gm., and calories 3884.

---

[1] I have taken the liberty to rearrange the matter presented in order to bring out more clearly the points germane to our subject.—W. S. C.

The average of these 34 dietary studies showed that 61 per cent. of the money spent was for animal foods, and 39 per cent. for vegetable foods, and about the same amount of protein was obtained from the animal as from the vegetable foods (slightly more from the vegetable foods).

Insufficient fresh air and sunlight is a frequent cause of anemia. Little children of the slums suffer from rickets in over one-fourth of all cases. In London one observer estimates 50 per cent. These babies are not only ghastly pale, and usually thin, but also they suffer from eczema, particularly at the wrists and behind the ears. The pale, flabby aspect of the school children in the foreign quarter must be attributed to crowded, ill-ventilated quarters as well as poor food. Among mill girls and employés in institutions, the form of anemia known as chlorosis (described later) is common, and it quite frequently appears in high-school girls by reason of overstudy and indoor life. We know already that adenoids can shut the nose and the school authorities can shut the window.

Insufficient rest is not recognized as it should be as a cause of ill health. The term brings up to the reader's mind the overworked laborer in the steel mills rather than the playing child. Unfortunately precocious indulgence in adult social pleasures entailing late hours has a rather firm grip on the youthful generation today. The curfew exists only in Gray's Elegy. Like the drink habit, the coffee habit, and the tobacco habit, late hours become after a while so habitual that the affected boy or girl is miserable at the prospect of a quiet evening at home. This excitomania is satisfied only by a dose of moving picture show, or an hour at the corner store, or a dance, or a card party. It must be acknowledged that often the basic weakness in our criticism is that the primary fault really lies in an unattractive home. Under this constant excitement, which is *not* play, the nervous system and the nutrition suffer severely. The characteristic haggard look appears and the weight is constantly below normal.

It should be borne in mind that ceaseless running around with late hours every night is not muscular exercise. The muscles in such case are not powerfully contracted as they are in running or swimming. The chief expenditure of energy is nervous rather than muscular.

Tuberculosis, which is an occas ... Thus in New in school children, is discussed in ... estigation diseases. So also is *hookworm disease.* ... k for

Which of the already mentioned f ... in the causation of poorly nourished sc ... to say. Among the well-to-do, overind ... pastry, nerve exhaustion from overstudy a ... lack of sleep and the use of coffee and toba

Fig. 181.—Poor nutrition, from poverty and neglect.

causes. Among the poorer classes lack of food and improperly cooked food probably come first. As I have said, cheap fish and beans (the latter a fortunate circumstance) form the principal proteid constituent. This proteid is usually below its proper proportion in the meal because it is the most expensive. Green vegetables are plentiful in the warm months, but in the winter the chief vegetable is potatoes. Among the poor Italians bananas in various stages of decay are consumed. The bread is of the coarsest and cheapest flour. Coffee, which contains no food and is harmful to children, is served. The statement is often made and possibly truly that the poor cooking of these ignorant people is worse than their poor food. Many of the women do not know

ther than to boil potatoes and fry articles in fat. The ever-present baby over one arm, it is really a feat of ...main for the poor immigrant woman to do this. Bread is ...en replaced by cheap cakes from the corner bakery, and thousands of children, when asked what they have had for breakfast, reply "coffee and cinnamon bun."

The a...
of the m...
food...

Lack of fresh air hits hardest the children of the poor. In

Fig. 182.—Poor nutrition, poverty, neglect. The smaller child has never had a bath. (Poor Italian children, Philadelphia.)

addition to the depression from poor ventilation and crowding at home, many immigrant children are sent to private little schools to learn Hebrew. These schools may be in session from four to six, so that the whole day is taken out of the child's natural life. Coffee and tobacco are even more potent causes of poor nutrition among this class than they are among the well-to-do. Coffee is cheap and milk is—to them—dear.

While it is obvious that poor nutrition exists to a greater degree among the poorer classes, the increase in cases is not exactly proportionate to descent in the social scale. Why this should be, in a statistical study, is not clear. Interesting extracts may be quoted from the reports of workers in New York, Chicago,

London, Boston and my own city on this subject. Thus in New York City the School Lunch Committee made an investigation "for malnutrition and its causes, carried on in New York for three months in 1910." Its report, partly reproduced, says:—

Prevalence of Poor Nutrition—(New York).

During the past year the New York School Lunch Committee has been engaged in the investigation of the home conditions of the children who apparently were suffering from malnutrition. Preliminary to this investigation a special medical examiner of the Department of Health examined 957 children in School No. 21 and 1094 children in School No. 51.

In School No. 21 he reported 130 children as suffering from malnutrition, and of the children examined in School No. 51 he ascribed malnutrition as the cause of the condition of the children in 153 cases.

In other words, 283, or 13.3%, of the 2051 children under the close scrutiny of the medical examinations were regarded as sufferers from malnutrition.

In order to secure an analysis of the home condition of the children adjudged to be suffering from malnutrition a special record chart was used.

The figures for the cards were gained through the co-operation of the medical examiner, the school teacher, and the home and school visitor.

Home Conditions of Poorly Nourished Children.

In 221 families mothers worked outside, and were not at home to prepare the noon meal for the children; this represents 9½% of all the mothers of the families under investigation; this corresponds fairly well with the results of another investigation made at Public School No. 51, where it was found that 200 children, or 10% of the whole attendance, had no one at home to prepare the noon lunch for them, and, as a consequence, were securing their lunches in the small stores of the neighborhood, from the pushcart man, or were substituting candy for the noon meal.

In 258 families, 60 had no prepared meal at home at noon for the children, or 21.2% of the families. Of the families of 130 children taking the lunches at school, 40, or 30%, had no lunches available for them at home.

The food supplied daily to the children was estimated approximately from the data given by the parents or caretakers of the children; of 222 families, 157 were supplying insufficient food; this represents 71% of the families under observation.

Of 141 taking their lunches at school, 108, or 77%, had insufficient food at home; this estimate was also supported by the fact that the

children in this group fell below the weight gained by the children with sufficient food at home.

Use of Tea and Coffee.

One of the greatest dietary bases, which is in part *cause* and in part *effect* of malnutrition—the use of tea and coffee among school children—has commanded considerable attention.

The following table shows the use of tea or coffee among 226 children:—

Tea or coffee once each day	131	58%
Tea or coffee more than once a day	79	35%
No tea or coffee	18	17%

Family Incomes of Poorly Nourished Children.

Taking $825 as a necessary yearly income for a family of five to maintain itself in an adequate manner in the city of New York, the following table shows another reason for the malnutrition of the children under investigation. The data included represents only that which is complete, and no figures are included which do not represent the total earnings of the families, as far as information could be secured from the family:—

Income over $16.00 per week	53	36%
" under " " "	93	64%
Total	146 families	

The 146 families fell in the following income groups:—

Income over $25 a week	16	11%
" $20 to $25 a week	19	33%
" $15 to $20 " "	22	15%
" $10 to $15 " "	51	35%
" $8 to $10 " "	14	10%
" under $8 a week	24	16%

Of 106 families whose children are taking their lunches at school, 77 families, or 73%, had incomes below the desired $16.00 per week.

Of the 106 families whose children took their lunches at school, 38, or 35%, were in the $10 to $15 per week group; 11, or 10%, were in the $8 to $10 per week group, and 24, or 23%, were in the under $8 per week group.

Benefit of School Lunches.

The main benefit of school lunches, so far as can be statistically gauged, lies in the effect of the lunches upon the weight of the children receiving them.

For the purpose of classification the children found to be suffering from malnutrition were divided into two classes—those who received

school lunches for a period longer than one month, and those who received no school lunches at all. At the end of three months each child in these two classes was examined again.

The group of children of whom there were complete records, and who received lunches, numbered 143; while the second group which received no lunches numbered 81, as far as the completed records were available.

The average gain in three months of the children *taking* the school lunches was 10⅛ ounces. The average gain of the children *not* taking lunches was 3⅝ ounces.

Another New York investigation was that of the Association for the Improvement of the Condition of the Poor, in 1907. I have not the actual report at hand and am compelled to quote from an article in the Philadelphia *Ledger,* September 10, 1907.

Commencing in May last, a committee appointed especially for the purpose, with Charles C. Burlingham, a former Superintendent of Education, as chairman, started an investigation, the result of which has just become known.

In order that the actual conditions in Greater New York might be determined, a corps of physicians was appointed by the local committee, and they visited each of the schools in the city. They inspected the card reports of the Board of Health, which showed the physical condition of the children. From time to time, as 100 cases had been examined, reports were made to headquarters until every section of the great city had been covered.

In this way the condition of the children of the rich, as well as the children of the poor, was made known. Children of the flats and tenements and children in the separate houses—the foreign and the native born—were examined alike, and as a result very accurate statistics bearing on hygiene in the schools were obtained.

These statistics were turned over to a committee composed of four physicians, two men and two women, who were instructed to make personal inspection in the cases of many of the children.

They visited 3690 homes, in most of which they were welcomed. In addition to the facts obtained by the physicians of the Board of Health, the members of the committee obtained facts concerning the social and physical conditions of the homes, the quantity and quality of food the children had, their sleeping accommodations, the income of the wage-earners, the amount paid out for rent, and the hygienic conditions.

It was found that out of 168 cases of children physically defective on account of malnutrition 54 cases were in families having an income of more than $20 a week, and 20 cases were in families having an income of less than $10 a week.

A rather surprising feature of this personal investigation was the fact that there were 1444 families who paid out 70.3 per cent. of their income for rent. At the same time it was shown that out of these same families there was a smaller number of children sent to the schools suffering with malnutrition than from the same number of families of comparative wealth.

Regarding differences seen among the poor of one district in London, Dr. Hall,[1] of Leeds, reports:—

"I was struck with the difference between Jew and Gentile. I examined 2700 children, and at 8 years old the poor Jewish child was on the average three pounds heavier and two inches taller than his Gentile comrade. At 10 years of age the Jew has the advantage of six and one-fourth pounds in weight and two and one-half inches in height. *Fifty per cent. of the Gentile children had rickets,* and only seven per cent. of the Jews." He attributes this to the better feeding of the children of Jewish parents, and he proved his point by feeding a certain number of children regularly from one of the poorest schools, and showed that they increased both in weight and in height more rapidly than those who were left to the tender mercies of their parents.

Concerning the investigation undertaken by Dr. Harrington, of Boston, into the home conditions of debilitated poor children, the *Survey,* April 22, 1911, says:—

An investigation undertaken by Dr. Harrington into the causes of debilitated and anemic conditions of children showed that in the children thus classified, all of whom were from crowded city districts, 70 per cent. came from homes that were relatively "good," whereas 30 per cent. were from the worst homes, classified as "poor."

The one investigation in this field by the writer was very small in scope. At the request of Miss Boughton, in charge of the Philadelphia school lunches served by the Home and School Association, I inspected all the children in the school at Darien and Buttonwood Streets (Philadelphia), and found among the 200 children 22 cases of pronounced poor nutrition. This school is in the tenderloin and has a poor and often shiftless American population. It was the purpose to install a system of nutritious three-cent lunches served at the noon hour, and through the kind offer of Mr. Otto Mallery, who has generously helped all such movements, all poorly nourished children too poor to pay

[1] Quoted from an article in *The Outlook,* Aug. 1, 1908.

were to be served free. However, as poverty as well as poor health should exist in order to justify charity, I asked Miss Cutler, the school nurse, to investigate the homes. Of the 22 parents visited, all of whom of course were poor, there were 3 found to be evidently very poor, and 6 where things looked doubtful. The financially doubtful cases were a milk dealer, machinist, watchman, tailor, carpenter, and printer. The solvent parents

Fig. 183.—Poor nutrition from poverty.

were tailor (2), painter, music dealer, carpenter, milliner, hatter, restaurant keeper, machinist, tin roofer, motorman, and manufacturer of horse blankets. The practically destitute parents were an engineer, seamstress, and tailor.

I can say that the general physical condition of the Russian, Polish, and Italian children in the poor foreign quarter of Philadelphia is better than that presented by the children in this school.

Here is repeated the experience of others, namely, that only one-third or one-fourth of the cases of malnutrition in the poor districts of our American cities can be attributed to absolute

lack of money to buy food. The cause in the majority of cases appears to be a combination of all the hardships of poverty and ignorance, working together, each in moderate degree.

PREVALENCE OF POOR NUTRITION.

This phase of poor nutrition among school children is treated rather exhaustively in the chapter on Prevalence of

Fig. 184.—Poor nutrition. Also flat chest, lateral curvature, pigeon breast.

Defects (page 599). Briefly and fairly accurately, evident poor nutrition exists in from 3 per cent. to 8 per cent. of school children, the proportion varying inversely with financial and social conditions. Among the children in the poorest city districts a below-average physique is the rule, many of the children looking slightly undersized and flabby. The relation of this, and even of pronounced malnutrition, to absolute destitution is not clear as one might suppose. In New York the special com-

mittee of the Board of Education investigated this relation and found that only 131 children of a school population of 23,000 in a very poor district were actually in need of food—less than 1 per cent. In two other school districts the proportion of destitute was found to be less than ½ per cent. The reports just quoted in connection with the causes of poor nutrition also refer to this phase of the subject. Which all shows what is really common sense, namely, that poor nutrition is a resultant of at least four forces, and combinations of these, so often found among the poor, are peculiarly successful in breaking down the health.

EVIDENCE OF POOR NUTRITION.

The evidence of poor nutrition is usually plain because in starvation the fatty tissues are the first to suffer. The poorly nourished child is usually below weight, thin, pale, and of thin, pinched facial expression. However, though the average case of poor nutrition is evident to any one at first sight and most others are evident when the child is undressed, there are complicating factors and exceptional conditions which warrant a systematic description of the condition.

Briefly, the state of nutrition is judged by, 1, the relation of age, height, and weight; 2, the quality of the blood, and, 3, the quality of the muscular and the connective tissues. It may be added that the signs of nervous exhaustion (see page 330) are often present in poorly nourished children.

Age, Height, and Weight.

The relation of age to height and weight has been carefully studied. Stanley Hall ("Adolescence," vol. i, page 6) quotes a paper by Boas giving the average *weight per age* of 45,000 boys and 43,000 girls tabulated from the combined findings of Bowditch, Porter, Peckham, and himself. Hall also quotes the statistics of Burk on the average *height per age* compiled after the examination of 60,000 children in Boston, St. Louis, and Milwaukee. From these statistics (here consolidated) it will be seen that the yearly increase in height is about two inches. The yearly increase in weight during the earlier years is about five

pounds per year. After the age of 10, however, the girls gain weight at the rate of eight pounds per year, and after the age of 12 the boys take on weight at the rate of ten pounds per year. By remembering the figures for the age of 10 years, one may readily reconstruct the table from memory.

Approximate age.	Boys.		Girls.	
	Average height (inches).	Average weight (pounds).	Average height (inches).	Average weight (pounds).
5.5	41.7	....	41.3	43.4
6.5	43.9	45.2	43.3	47.7
7.5	46.0	49.5	45.7	52.5
8.5	48.8	54.5	47.7	57.4
9.5	50.0	59.6	49.7	62.9
10.5	51.9	65.4	51.7	69.5
11.5	53.6	70.7	53.8	78.7
12.5	55.4	76.9	56.1	88.7
13.5	57.5	84.8	58.5	98.3
14.5	60.0	95.2	60.4	106.7
15.5	62.9	107.4	61.6	112.3
16.5	64.9	121.0	62.2	115.4
17.5	66.5	....	62.7	114.9
18.5	67.4	....	....	....

The above table has its uses and its limitations. It offers little to the school medical inspector, who does not need scales or a measuring stick to detect a poorly nourished child. In individual cases it may prove misleading, for Italians, for instance, are smaller than Germans or Swedes. Also that particular form of malnutrition known as chlorosis (*vide*) would be judged wrongly on the basis of weight per age, for its subjects are usually plump with unhealthy fat. On the other hand, the anthropologist, the institution superintendent watching the effect of diet upon his charges, and the parent observing the yearly growth of his child will find exact figures and standard figures valuable and helpful.

The Quality of the Blood.

The red blood-corpuscles, which normally number a full five million to the cubic millimeter of blood, are usually reduced in number in cases of poor nutrition. More constantly still is the

hemoglobin (oxygen-bearing substance) of the corpuscles low in quantity, so that it registers only 70 to 85 per cent. of normal. In the blood tests made to prove the value of open-air schools at Bradford, England (page 127), the hemoglobin of the poorly nourished children was found to be in this condition.

Quality of the Tissues.

The tissues of the healthy child are firm, even hard, if the muscles are trained by exercise. In poorly nourished children they are flabby and toneless.

RICKETS.

The great frequency of bone deformities in children and the tender age of kindergarten and first-grade children provide the reason for consideration here of a disease generally regarded as peculiar to infants.

It should be realized first of all that rickets is a peculiar form of malnutrition, not simply a disease of the bones. Most cases arise between the fifth and eighteenth months of life, although a poorly nourished mother may give birth to a rickety child, and, again, the disease may not appear before late infancy. With the establishment of a general diet and outdoor habits (that is, about the end of the second year) the disease loses its distinguishing characteristics and either disappears or passes into a case of ordinary malnutrition. Permanent marks unfortunately often remain.

The cause of rickets may be summed up as poor hygiene. Improper diet[1] (deficiency of fats, proteids, and lime and excess of starches) is generally stated to be the principal factor, and it is probably a requisite one, but lack of fresh air is almost as important. Most cases of rickets appear to result from their combined action.

---

[1] Nursing by an exhausted mother provides poor food. Condensed milk is sugared to preserve it, and so is very high in carbohydrates. The cheap foodstuffs of the poor are generally starchy in character and lacking in proteid and fat. Poor food produces indigestion, and this, in turn, lowers the ability to use the food taken into the stomach.

The rachitic infant is *anemic,* usually ghastly pale and undersized, and dyspeptic, with distended abdomen and constipation or else diarrhea with foul stools. *Nervous exhaustion* causes restlessness, spasms of the body muscles (tetany), convulsions, and relaxed, sweating skin. *Soft bones* from lime-salt deficiency may cause bow-legs, knock-knees, spinal curvature, "corroded" teeth, and bulging forehead. *Lack of vitality* causes bronchial catarrh and tendency to pneumonia and other infectious diseases. It is well known that rickety children often show enlarged tonsils and adenoids. They are afflicted with tuberculosis in larger proportion than other children. Scurvy is sometimes present in addition to the rickets.

SCURVY.

Scurvy (scorbutus) is a form of poor nutrition occurring at all ages and due to a lack of fresh vegetables and fruits in the dietary. In adult life the disease is very rare, although in the old days of sailing ships it was a common disease among sailors. In children it is found occasionally in the poorer quarters of our large cities.

Its distinguishing features, apart from a condition of general poor nutrition, are soft, spongy, bleeding gums and general muscular tenderness. The bleeding in severe cases may be not only from the gums, but from the mucous membranes generally and under the skin (purpura).

CHLOROSIS.

Chlorosis is a peculiar variety of anemia in which poor nutrition and poverty of blood elements are characteristic. It exists particularly in young adults (almost always girls and women), and because of the white-green pallor of its possessors is sometimes termed "green sickness" (whence the Greek term chlorosis).

A particular predisposition to the disease exists in some people, and these are usually members of families that are generally delicate and neurotic. The weak constitution does not withstand depressing influences.

The actual causes of chlorosis are those of poor nutrition generally, but particularly lack of fresh air, constipation, and sexual overindulgence. Lack of exercise, worry, overwork, and a rich or pasty food contribute.

The signs of chlorosis are the signs of anemia (pallor of the skin and *mucous membranes,* indigestion, headaches, dizziness, irregular menses, lassitude, nervous exhaustion, heart palpitation, throbbing of the blood-vessels, and deficiency of red blood-corpuscles and hemoglobin). The peculiar sign of chlorosis is the greenish-white pallor already mentioned, due to the extraordinarily low proportion of hemoglobin. This sign, by the way, is very deceptive, many chlorosis cases having a good color ordinarily and only showing the green pallor when nervous, frightened, or fatigued.

Girls suffering from chlorosis are not necessarily thin and underweight. Many are plump from the presence of a soft fat differing materially from hard, healthy fat. The tissues appear to manufacture this soft, hydremic fat because of inability to form muscle and hard, healthy fat.

The treatment of chlorosis is the correction of constipation and the institution of a healthful outdoor mode of living. Iron should be given for the anemia. Owing to the peculiar lack of vital resistance of the subject, she (or he) should carefully avoid the factors known to have produced the first attack or recurrence will ensue.

Gout—Lithemia.

These diseases, closely allied and due to faulty metabolism, are not often seen in school children. Gout, in fact, may be considered absent. Lithemia (arising more from lack of nerve force than from overeating) occasionally occurs. Children suffering from lithemia are usually those of neurotic parents, in comfortable or better circumstances, are rather thin, nervous, and perhaps show dry eczema, psoriasis, or some related skin disease. Here the cause is not lack of food nor lack of fresh air, but usually overstudy at school, nerve-racking friction at home, or too rich or indigestible food. The treatment is mental relaxation, plenty of outdoor play with healthy children, and a diet of milk, bread, butter, and fresh green vegetables.

Other Forms of Poor Nutrition.

Tuberculosis, hookworm, syphilis, Bright's disease (kidney disease), all cause poor nutrition and anemia. Children recovering from acute rheumatism and from diphtheria are also markedly anemic for a while.

These diseases are here mentioned because some cases of poor nutrition and anemia are due to some deeper cause than simple unhygienic mode of life, and any case which does not quickly respond to the ordinary treatment of good food, air, rest, and iron medication should receive a thorough medical examination.

TREATMENT OF POOR NUTRITION.

The treatment of poor nutrition consists of:—

1. Fresh air.
2. Sufficient rest (waking as well as sleeping).
3. Sufficient muscular exercise.
4. Temperate habits.
5. Sufficient and proper food.

Also in cases of anemia:—

6. Iron and other direct blood-building substances.

Also in cases of hookworm disease, tuberculosis, nervous exhaustion, and heart disease:—

7. Special measures prescribed by the attending physician.

So much space has already been given to the subjects of fresh air (pp. 115, 155), exercise (p. 173), proper habits (pp. 195, 325), and recreative periods in the school curriculum that good hygiene outside the home itself has been sufficiently considered.

In the home, in addition to an easy application of the subjects just mentioned, there remains to be considered the question of food in its relation to the child's health.

Food—Diet.

The following principles concerning food are basic:—

1. Digestion is the process of making the food soluble. Absorption of food and its use by the tissues are termed

assimilation. Food to the individual is not food until it has been digested and assimilated. Digestion requires, in addition to properly prepared food, (*a*) sound teeth, sound stomach, and sound intestines; (*b*) thorough chewing of the food, thereby giving better conception of the taste, which, in turn, unconsciously causes better secretion of the gastric juice, and also thorough mixing of the starch-digesting saliva with the food; (*c*) leisure and a cheerful spirit[1] while eating. The hurried man and the worried man upset their digestive organis so that they fail to work properly.

About 5 to 10 per cent. of the food eaten fails of digestion or absorption. This waste must be allowed for when calculating a dietary.

2. The food must be in the form of proteid, carbohydrate, fat, salt, or water. Of the first four there are several varieties each, although the only salt used in considerable quantity is the ordinary table salt—sodium chloride.

3. An adult requires sufficient food each day to produce (about) 4000 calories of heat; a school child sufficient to produce 2000 to 2500 calories.

In this connection the amount of food (the total expressed in its energy equivalent in heat calories, and also the amount of proteid necessary) may be quoted from Atwater:—

> A man with hard muscular work, protein 175 Gm. (or 0.39 pound) with fat and carbohydrates in sufficient amounts to produce a fuel value of 5500 calories.
>
> A man with moderately active muscular work, protein 125 Gm.

---

[1] The papers and book of Mr. Horace Fletcher may well be read in this connection. See "Possible Progressive Growth in Muscular Efficiency after Fifty Years of Life without Systematic Muscular Exercise," New York Medical Journal, Nov. 30, 1907.

Two well-known experiments may also be mentioned. In one the power of the mind over the digestion was shown by the abundant secretion of gastric juice in a dog's stomach after the animal had been tempted with a piece of meat and also after it had been fed the meat—which did not stay in the stomach, but was immediately taken out through an artificial opening. In the other experiment advantage was taken of the visibility of bismuth subnitrate by the X-ray after this substance has been swallowed and is slowly passing down through the stomach and intestines. A cat was fed bismuth (mixed with meat), and the bismuth was then observed with the X-ray and fluoroscope. When the cat was teased to fretfulness and anger the peristaltic waves of the intestines (evidenced by the advance of the bismuth) were seen to cease.

with fat and carbohydrates enough to produce a fuel value of 4150 calories.

A man with light to moderate muscular work, protein 112 Gm. (or 0.28 pound) with fat and carbohydrates enough to produce a fuel value of 3400 calories.

A man at "sedentary" or a woman with moderately active work, protein 100 Gm. (or 0.22 pound) with fat and carbohydrates enough to produce a fuel value of 2700 calories.

A woman at light or moderately muscular work, or a man without muscular exercise, protein 90 Gm. (or 0.20 pound) with fat and carbohydrates enough to produce a fuel value of 2450 calories.

Which information may be restated, giving the relative amounts required by men, women, and children:—

A man at hard muscular work requires 1.2 the food of a man at moderately active work.

A man with light muscular work and a boy 15 to 16 years old require 0.9 the food of a man at moderately active work.

A man at sedentary occupation, a woman at moderately active work, a boy 13 to 14, and a girl 15 to 16 years old require 0.8 the food of a man at moderately active muscular work.

A woman at light work, a boy 12 or girl 13 to 14 years old require 0.7 the food of a man at moderately active muscular work.

A boy 10 to 11 and a girl 10 to 12 years old require 0.6 the food of a man at moderately active muscular work.

A child 6 to 9 years old requires 0.5 the food of a man at moderately active muscular work. A child 2 to 5 years old requires 0.4 the food of a man at moderately active muscular work. A child under 2 years old requires 0.3 the food of a man at moderately active muscular work.

4. The food just mentioned is not all expended for heat energy. Some of it is used in work energy and some to build up the tissues.

5. Not only is a certain quantity of food necessary, but also a certain *quality* of food. It is essential that proteid is in the diet because proteid is the only form of food capable of building up the tissues of the body. Salt is just as essential. Without these two life cannot continue. On the other hand, carbohydrates and fats are extremely useful (almost necessary) because they furnish abundance of heat and working energy and do not clog the system with by-products.

The best proportion of proteid, fat, and carbohydrate is known as a "balanced ration" and may be put down (authorities

differ slightly) as 100 grams proteid, 105 grams fat, 450 grams carbohydrate, and 35 grams salt. The proteid is not replaceable, but the relative proportions of fats and carbohydrates may be changed without inconvenience.

The energy-yielding powers of the three classes of foods are:—

Proteid yields 2000 calories per pound (or 1 gram yields 4.1 calories). Fat yields 4000 calories per pound (or 8 grams yields 9.3 calories). Carbohydrate yields 2000 calories per pound (or 1 gram yields 4.1 calories).

The salt constituent in the food is not measured. The fresh vegetables, milk, other foodstuffs, and the table salt used supply sufficient salts, and any excess passes through the body without affecting it.

In the table below it may be noted that a foodstuff high in energy must be either fatty or dry. For this reason fresh vegetables, which are largely water, are low in fuel value.

If one wishes to supply a child with a daily ration containing total fuel value of 2500 calories and sufficient proteid to yield 350 calories, a table of foodstuffs is useful. In the one here presented (only approximately accurate for some items, but good enough), the percentage composition is given for proteid, fat, carbohydrate, and water (as sometimes there are cellulose and other inactive products in foods, the figures given do not always total to 100 per cent.).

The proteid value in calories, given in the table, is readily calculated by multiplying the fraction of a pound in the first proteid column by the number 2000, since each pound of proteid yields that much energy. If the fat and the proteid are wanted by the reader, he is to similarly multiply the amounts of these substances given by 4000 and by 2000, respectively. These are omitted in the table, only the total being given.

The general idea is to select foodstuffs outside the fresh vegetable and fat classes until sufficient proteid has been procured and then bring up the total either with fats and oils or with fresh vegetables, potatoes, and bread, which are largely carbohydrates.

Fortunately most cases of poor nutrition respond readily to good food and fresh country air, without weighing or measuring

Table Showing (a) the Composition of Familiar Foodstuffs, (b) their Proteid Energy, and their Total Energy.

Foodstuff.	Condition.	Composition (percentage).				Energy per lb. (expressed in calories).	
		Prot.	Fat.	Carb.	Water.	Prot.	Total
Pure fats (lard, cottolene, olive oil)	....	0	1.00	0	0	0	4200
Butter	....	0	.90	0	.10	0	3600
Nuts (except chestnuts)	....	.15	.60	.20	.05	300	3000
Chocolate	in package	.14	.47	.18	....	280	2800
Cocoa	in package	.05	.15	.75	....	100	2300
Crackers and cookies	baked	....	....	....	....	....	2000
Cheese (American)	....	.29	.37	....	.30	600	2100
Cheese (cottage)	....	.21	.01	.04	.72	400	500
Red meat (average)	raw	.20	.14	0	.66	400	1000
	cooked	....	....	....	....	....	1300
Red meat (when fat)	raw	.17	.30	0	.53	350	1800
	cooked	....	....	....	....	....	1500
Red meat (when lean)	raw	.20	.08	0	.72	400	600
	cooked	....	....	....	....	....	960
Chicken	raw	.22	.03	0	.75	440	500
Chicken	cooked	....	....	....	....	....	1280
Fish	raw	.16	.01	0	.83	320	350
Oysters	raw	.07	.01	.04	.88	140	250
Thick soups and meat stews	....	....	....	....	....	....	350
Flour (wheat, corn, oat, breakfast foods, rice)	uncooked	.13	.02	.68	.07	260	1700
Bread	baked	.09	.01	.53	.37	200	1200
Puddings and pies	....	....	....	....	....	....	800
Fresh vegetables (cabbage, cauliflower, turnip, beet)	....	.02	0	.06	.90	40	380
Potato, white	raw	.02	0	.18	.79	18	385
Potato, sweet	raw	....	....	....	....	....	570
Tomatoes	....	.01	....	.04	.95	20	105

Table Showing the Composition of Familiar Foodstuffs (Continued).

Foodstuff	Condition.	Composition (percentage).				Energy per lb. (expressed in calories).	
		Prot.	Fat.	Carb.	Water.	Prot.	Total.
Peas	green	.07	.01	.17	.75	140	465
Peas	dried	.24	.01	.62	.09	480	1655
Beans (much like peas)							
Milk, whole	....	.04	.04	.05	,87	80	325
skimmed	....	.04	0	.05	.90	80	180
whey	....	.01	0	.05	.94	20	125
cream	....	.03	.16	.04	.76	60	900
Egg, whole	raw	.14	.11	....	.75	280	750
white of	raw	.12	.01	....	.86	240	250
Grapes	....	.01	.02	.19	.77	20	450
Bananas	....	.01	.02	.22	.75	20	460
Celery	....	.01	0	.03	.95	20	85
Spinach	....	.02	0	.03	.92	40	100
Prunes	stewed	....	....	....	....	....	800

either. It is rather in the later years of life that the much abused organism shows such wear and tear that carefully regulated habits and diet are a necessity. With little or no "scientific" supervision, the children's charities of our great cities build up thousands of sickly little ones each year by simply sending them out into the country for two or three weeks. There, with freedom from care, the youthful body produces the energy which in turn causes exercise in the fresh air, healthy appetite, healthy sleep, and increase in weight.

THE SKIN.

The skin affords great opportunity for the existence of disease, since it suffers not only from the ills of the whole body, but also from others due to its exposure to dirt, wounds, germs, and parasites.

Classification of Skin Diseases.

In children, the principal skin diseases may be divided into two groups and four subgroups:—

- Diseases due to general disturbance of the body processes.
  - Skin rashes due to the acute infectious diseases.
  - Diseases due to disturbances of nutrition.
- Diseases due to local (*i.e.,* external) causes.
  - Diseases of non-parasitic local origin.
  - Diseases of parasitic local origin.

The existence of skin disease depends largely upon two factors—age and social condition.

The age factor shows itself plainly when one examines the most prevalent diseases of (*a*) infancy, (*b*) early youth, (*c*) middle and past-middle life, and (*d*) old age. While we are considering only the second of these in detail, it is well to know the probabilities as well as the improbabilities. In *infancy* the skin diseases are mostly those of poor nutrition, due to the wrong diet, and to lack of sunlight. Babies fed upon cows' milk frequently show eczema of the scalp, face, and hands, and the babies of the slums, in basements and cellars, deprived of sunlight, are pale, thin, and very often sufferers from raw, weeping eczemas affecting particularly the regions behind the ears and the wrists. In *early youth,* which is the school age, the child is able to select his food, and runs around in the fresh air in vigorous exercise. Consequently, with the exception of a very few ill-nourished slum children, skin diseases due to constitutional disorders are practically unknown. Here, however, the child contracts measles, chicken-pox, and possibly other of the

acute infections exhibiting skin rashes. The other skin diseases occurring are practically all due to local causes, and range from accidental wounds, and inflammations from burns, irritation, to parasitic and germ diseases, such as head-lice and impetigo. *In school children, as a rule, the cause is obvious.* In *middle and past-middle life* the human body, like the tree bent the way the twig has been inclined, begins to show the effects of unhealthful modes of living, and gout, diabetes, kidney disease, rheumatism, and lithemia—all potent causes of tissue poisons or irritants—produce most of the skin diseases. In *old age,* these same diseases, plus a poor circulation, continue to produce diseases of a *general* rather than of a local significance.

The social factor (ignorance and poverty) principally determines the existence or non-existence of skin diseases in children of school age. The dirty child picks up pediculosis, scabies, impetigo, and infected wounds. When poorly nourished, as he often is, these wounds are more liable to infection, and simple skin inflammations are more likely to become actual eczemas.

The school inspector dealing with the better social class of children sees very few cases of skin disease. His colleague in the slum districts sees a score of cases every day. On pages 129, 133, and 136 are given the cases of skin disease encountered in the schools by the medical inspectors and nurses of New York and Philadelphia. From these one may gain some conception of their enormous number and considerable variety.

Skin Affections Occurring in School Children.

Before considering the most frequent skin diseases of school children, certain descriptive terms may be defined.

Macules are circumscribed, discolored areas. The skin is not raised nor depressed.

Papules are solid elevations of the skin, pinhead- to pea-sized.

Vesicles are elevations of the epidermis, pinhead- to pea-sized, containing clear or opaque fluid.

Pustules are defined as vesicles, except that the fluid contained is pus.

Bullæ or *blebs* are defined as vesicles, except they are large —pea- to egg- sized.

Erythema is a reddening of the skin.

Such terms as *crusts, scales, ulcers,* and *tumors* (swellings) are already familiar to the reader.

Skin Rashes Due to the Acute Infectious Diseases.

These have been already described in the chapter on Infectious Diseases. Those to be borne in mind are measles, German measles, chicken-pox, and scarlet fever. With vaccination laws properly enforced, small-pox need not be considered. The rash of syphilis seldom exists in the years of school life, since the congenital cases show the rash in early infancy and most acquired cases originate after maturity has been reached.

The existence of one of the acute infections is judged by the character of the rash, the fact that the child is sick and feverish, and the presence of symptoms peculiar to that disease. (See page 549.)

Skin Diseases of School Children Due to Disturbances of Nutrition.

The great majority of these belong to the group termed eczema. Some are cases of acne, and a few each herpes and psoriasis.

The fact that the child that is poorly nourished is more open to infection of the skin by pus germs, thereby favoring impetigo, pustular dermatitis, and infection of wounds, should be remembered.

Eczema.

Eczema is a non-contagious inflammation of the skin, caused principally, or altogether, by disturbances of nutrition. Eczema is characterized by thickening and reddening of the skin and by itching and burning. Since it may show either erythema, papules, vesicles, or pustules, be either acute or chronic, and be either a small spot or an extensive area, a great variety of appearances may exist in this group and the diagnosis consequently be uncertain. Fortunately the treatment of all doubtful

skin diseases is the sensible one of building up the general health, improving the circulation, and (either) soothing (or stimulating) the affected skin by local remedies. The resemblance in children of dermatitis to eczema need cause even less concern to the physician, since dermatitis cases speedily get well of themselves.

The cause of eczema in children is poor or perverted nutrition. In many cases this is not quite sufficient in itself to cause the disease, but eczema easily results from mechanical irritation, cold water; cold, damp air; mucus from the nose, and other agencies.

The most common varieties of eczema in school children are:—

Dry, Eczematous Patches on the Face.—In some instances these are due to poor nutrition plus the use of cheap soap. In the brewery district of Philadelphia dry, pale, round, scaly patches are common on the faces of the children. One of the school principals ascribed it to the daily consumption of beer, but I am inclined to believe that German cakes, coffee, and sausage are more probably the cause. Possibly the disease is really parasitic, some of the cases bearing a faint resemblance to ringworm.

Vesicular Eczema.—The ordinary moist eczema with covering crusts or scabs is seen in young children who are pale and sickly. The majority of the cases are found in the three lowest grades. The eruption is usually located on the face, on the wrists, or behind the ears.

Patches of eczema in the region of the mouth and nose point to nasal obstruction with its nasal catarrh and mouth breathing. The skin is affected by the mucopurulent discharge, and by the constant licking of the dry lips.

Eczema of the scalp at the back part of the head is suggestive of pediculosis, with its consequent scratching by the child and biting by the head-lice.

Eczema seborrhœicum is seen in infants and young children that are poorly nourished. It shows an area of greasy dandruff and loss of considerable hair. There is a secondary infection of the scalp by germs, as well as the basic condition of poor nutrition. Accordingly, the treatment is by tonics, fresh air, and

general hygiene, and also by local antiseptic applications of moderate strength.

Acne.

Acne—commonly known as pimples—is an inflammation of the sebaceous glands of the skin. It is particularly a disease of youth (10 to 25 years) because of the activity of the whole glandular system during that period. The principal directly exciting causes are dyspepsia, overeating, constipation, nervous exhaustion from overwork, worry, sexual excesses, or menstrual disturbances. Some medicines, particularly bromides, produce an acne rash, and the nervous child dosed with bromides by the doctor is likely to find himself worse off than before treatment.

The treatment of acne is to correct the habits of living, remove all causes of nervousness, improve the circulation of the skin by facial massage and steaming with hot cloths, and remove accumulations of grease from the skin by lotions containing sulphur, afterward washed off. The X-ray has been used to stimulate the skin and kill the pus germs lurking in the sebaceous glands. Recently the treatment of obstinate cases by vaccine prepared from the germs present, with the purpose of raising the vital resistance against them, has been successful.

Herpes.

Here only the simple herpes of the face ("fever blister" or "cold sore") is considered. It is a familiar affection characterized by first a swelling and itching at some point along the lip and then the formation of a few small vesicles. These coalesce; their contents become turbid, rupture, and finally show dried yellowish-brown crusts, which remain for a few days.

The cause is some poisonous substance in the blood which has affected the nerves supplying the area affected. Usually this is nothing worse than indigestion or some nervous disturbance. Herpes are seen at the beginning of several of the infectious diseases, notably pneumonia and influenza.

The treatment is a dose of salts or other laxative, and the application to the blister of spirits of camphor (early), or zinc ointment, or cold cream (late).

Psoriasis.

This disease, which is not very common, and when occurring is usually found in adults, is here mentioned because cases will be found occasionally in school children of the nervous, poorly nourished type, more often among the better than the poorer class.

Psoriasis is a chronic disease, non-contagious, consisting of a sluggish inflammation of the skin with the formation of characteristic white, dry scales. Beneath the scales the skin is reddened, easily made to bleed by scratching, and shows papules. Each patch is round and well defined with sharp edges. Its size is variable—from pea size to dollar size. The amount of body surface affected is also variable, the disease sometimes appearing only on the elbows, or knees, or scalp, or backs of the forearms, and sometimes being extensive over the trunk. The regions mentioned are those in which the skin circulation is poorest.

The treatment is to correct any disturbances of nutrition and to stimulate the circulation of the skin. In children the diet, the amount of sleep, of exercise, and of nervous strain, should be carefully inquired into. In adults more or less gout or lithemia is usually present in the patient.

Skin Diseases of Non-parasitic Local Origin.

The medical inspector of school children will find in this group minor cuts and scratches, minor infections of the skin, and a few skin diseases, miscellaneous in character.

These skin affections of accidental mechanical origin are skin *abrasions, contusions* (bruises), *wounds* (which are subdivided into "punctured," "incised," "lacerated," and "infected"), *burns,* and *dermatitis* (which is a simple inflammation of the skin due to any evident cause, such as heat, sunlight, poison ivy, a rough undergarment, *et cetera*). Dermatitis, like herpes and like eczema, may become secondarily infected by the ordinary pus germs.

Those skin affections due to accidental infection by pus germs are *impetigo, impetigo contagiosa, boils,* and probably *warts.* Of these simple impetigo consists of little superficial pustules, usually on the hands, forearms, neck, and wrists of dirty

little children, particularly of those who wear unwashed woolen sweaters from November to April. These sweaters (jerseys) become filthy and the wristbands impregnated with grime, nasal mucus, and food. Once the offending garment is washed and the child washed, the infection speedily disappears. Contagious impetigo is characterized by flat pustules, with loose curled scabs on a wet base. It is seen in the springtime, before the first bathing time, among the children of the slovenly poor, and is

1 2 3

Fig. 185.—Skin diseases. 1, impetigo contagiosa on chin; 2, ringworm on wrist; 3, scabies on hands and forearms, which are swollen from scratching.

spread by the playing together of perspiring children on a warm day. An interesting epidemic of this disease numbering 60 cases occurred in a college shortly after the annual springtime fight between the freshmen and sophomores. In this fight the clothing was pretty well torn off and wrestling and tussling freely indulged in. The treatment is by some antiseptic ointment. Boils, while here classed as a local infection due to germ invasion of some hair root and the deeper layer of the skin, are really favored by poor general health. The child showing a boil is usually poorly nourished, and the high-school or college student usually knows the reason whereof. More sleep and less work or dissipation, together with simple, good

food and regulation of the bowels, constitute the prevention of other boils succeeding the first one. Warts, whether of spontaneous or infectious origin, are new growths which are removed by applications of such antiseptics as salicylic acid or cauterization by silver nitrate, or by nitric acid, or by electrolysis. The number of warts which may appear upon the hands of one child and the fact that brothers and sisters are often affected are the indications that they are slightly contagious.

The remaining affections in this class are due either to defects in skin structure or to disturbances of function. These are not common. Among them are seborrhea, comedo, keratosis, sudamina, miliaria, and anidrosis, which may be found described in special books on skin affections.

Diseases of Parasitic Origin.

Principal among these is pediculosis. Scabies, ringworms, and favus may also be considered.

Pediculosis.

Pediculosis, or lousiness, may affect either the head (hair) or the body. Head infection is exceedingly common among the lower classes, particularly immigrants from southeastern Russia. In the foreign quarter of a large city probably 5 or 10 per cent. of the younger girls are infected. One of the Philadelphia nurses, just previous to this writing, found 24 cases in a class of 40 girls. Pediculosis is rare among negroes, because of the coarse quality of the hair.

Pediculosis is a contagious disease. The pediculi, or lice, are of two kinds,—those infesting the scalp, and those infesting the body. The *head-louse* is betrayed by the itching it excites, by the numerous eggs or "nits" attached to the hairs of the regions behind the ears, by the discovery of the animal itself moving around in the hair, and in severe cases by the inflammation of the scalp caused by the biting of the parasite and the scratching of the child.

The nits are attached firmly to the hairs by a gelatinous substance, thereby differing from flakes of dandruff, which are occasionally seen loose in the hair after being shed from the

scalp. No search is complete unless the deeper hair (particularly behind the ears) is examined, since many children superficially clean are extremely dirty in the parts not usually seen. Every inflammation of the scalp, if it be in the back part, should cause a suspicion of pediculosis.

The best treatment for pediculosis is the thorough washing of the scalp on two successive nights with a mixture of kerosene oil and sweet oil. This will kill the pediculi and nits, although the latter still adhere to the hair. They may be removed by subsequently washing the hair with vinegar.

The *body-louse* is larger than the species found in the hair. It lurks in the seams of the undergarments, occasionally annoying the person affected by its bites and movements. Examination of the body shows the skin, particularly of the waist region, to be excoriated by bites and scratches.

The treatment consists in boiling the underclothing and bed linen. Where home conditions are such that reinfection is probable, sulphur ointment should be used.

Scabies.

Scabies, or the "itch," is an animal parasitic disease caused by the itch-mite. The female, which is of a size just visible to the eye, burrows into the skin and travels just beneath the surface for about a quarter of an inch. A short, dark line on the skin marks the progress of the animal. The mite, its eggs, and excrement combine to cause a local inflammation, which is made worse by scratching. So much indeed of the inflammation is due to this scratching that cases of scabies in different persons differ considerably in appearance. A general appearance of inflamed short scratches, usually on a dirty child, is characteristic. The favorite location is between the fingers or other region where the skin is thin, or on the palm of the hand and the wrist and forearm above.

Scabies, if untreated, will spread and persist indefinitely. It is quite contagious to others of the same family.

Scabies is readily cured. A hot bath, thorough cleansing with soap and water, and application for six to ten nights of sulphur ointment will, in most cases, be sufficient treatment.

Ringworm.

Ringworm is due to a vegetable ("trichophyton") fungus. The two varieties seen in children are ringworm of the smooth skin (tinea circinata) and ringworm of the scalp (tinea tonsurans).

Tinea circinata, ordinary ringworm, begins as a small reddish, scaly patch, about pea size. This patch increases in size gradually until its diameter may be that of a silver dollar. Meanwhile, the central part (the oldest part) recovers, and a characteristic ring-like appearance results.

There may be more than one "ringworm" at one time. The location is usually on the face, wrists, neck, or hands. It is distinguished from eczema and other diseases by the *dry, reddish, scaling skin,* later by the ring appearance, by the superficial character of the skin inflammation, and with certainty by gently scraping off a few scales and examining them (in a drop or two of 40 per cent. caustic potash solution) under the microscope. In institutions and sometimes in the school, the previous occurrence of other cases makes the diagnosis easy.

The disease is quite contagious in institutions and mildly contagious in the schools. On one occasion the writer found 3 cases in one school room. It is not common among the better class, but in the poor foreign districts of our cities the school inspector sees two or three cases every week.

The treatment may be the application of tincture of iodine (very good) or some antiseptic ointment, such as mercury, sulphur, or resorcin. Even zinc ointment will cure it, although requiring a few days more time.

Tinea tonsurans, or ringworm of the scalp, is also caused by the trichophyton fungus. The disease begins as one or more reddish, scaly patches. The patches increase in size, the hair roots are affected, and the hair breaks off or falls out. The scalp looks dry, dully inflamed, and moth-eaten. The disease is hard to cure, several months' treatment often being required. It is somewhat contagious.

The treatment consists of antiseptic lotions and ointments (mercury, sulphur, *et cetera*). The X-ray may be used.

Favus.

Favus (tinea favosa) is a parasitic disease of the scalp somewhat resembling ringworm. It is caused by a vegetable fungus. Like the ringworm, it produces a dry scalp disease, with falling out or breaking and splitting of the hair. The area affected may be small, although my own experience has been with patches usually two or three square inches in diameter. Its distinguishing feature (from ringworm) is the dry, yellow, friable crust thrown around the root of each hair. This may be a continuous coalesced area, or there may be single yellow crusts, each one around the base of a hair, split-pea-sized, like a little dry mud pie.

The disease is not very contagious. It is found only among the poor. In the slum districts of a large city the medical inspector may see four or five cases in the course of a year.

The treatment is the same as the treatment of scalp ringworm. The disease is obstinate.

The Treatment of Skin Diseases.

Of the four groups of skin diseases just described, the rashes due to the acute infectious diseases require no treatment, since they disappear of themselves in the course of a few days. The treatment of the parasitic diseases has been given in connection with their description. The two remaining groups require some consideration.

Wounds require cleanliness more than anything else. Plenty of warm water and soap almost certainly prevent subsequent infection. Deep wounds, if not cauterized, always entail some risk of tetanus (lockjaw), and this, by the way, indicates that the school inspector should not undertake the treatment of such cases, but should rather send them home with instruction to seek the family physician or a dispensary at once. The responsibility is thus placed where it belongs—upon the parent. All superficial cuts, scratches, and wounds, as well as slight burns, heal readily under the influence of some soothing, mildly antiseptic substance, such as zinc ointment or boric acid ointment. The former is of such value in school work that it deserves special mention, for the nurses dab it on almost every-

thing encountered, and heal most of their cases. Even impetigo, impetigo contagiosa, and ringworm (not of the scalp) are cured by zinc ointment.

Eczema, which in many cases is distinguished from dermatitis only by the fact that it does not heal unless internal medical treatment is also instituted, does in many other cases disappear under the influence of zinc ointment alone.

The foregoing is not a eulogy on zinc ointment. There are several other applications just as good. The writer's intention is to emphasize the rule already laid down that, *in the case of children of school age, skin diseases usually result from local, external, evident, and removable causes, and are, therefore, easy to heal.*

Without entering into a discussion of their application to particular skin diseases, it is well to give the reader some idea of the action of skin medicaments. Such knowledge simplifies the subject very much.

All skin medicaments may be classed (*a*) according to their soothing or (else) their stimulating qualities, and (*b*) according to the degree of their antiseptic power:—

Soothing or Stimulating.	*Degree of Antiseptic Power.*
Soothing.	Weakly antiseptic.
Mildly stimulating.	Moderately antiseptic.
Strongly stimulating.	Strongly antiseptic.

Soothing applications are: 1, simple oils and grease, which exclude air—the latter is irritating to burned, or blistered, or eczematous skin; 2, boric acid; 3, zinc oxide. Applications which deaden the nerve endings, and thereby indirectly soothe, are: 4, dilute solution of carbolic acid; 5, menthol.

Mildly stimulating applications are: 1, resorcin; 2, salicylic acid; 3, mercury in ointment form; 4, ammoniated mercury.

Strongly stimulating substances are: 1, tar; 2, oil of cade.

Weakly antiseptic applications to the skin are: 1, boric acid; 2, zinc oxide.

Moderately powerful antiseptic applications are: 1, resorcin; 2, salicylic acid; 3, mercury in the ointment form; 4, sulphur.

Powerfully antiseptic applications are: 1, bichloride of

mercury in 1:1000 water solution; 2, carbolic acid in weak (1 per cent.) solution; 3, ammoniated mercury; 4, tar; 5, tincture of iodine.

From the above may be formulated the following list:—

Bland oils, greases, or powders, such as ung. petrolatum (vaselin), lard, olive oil, starch, flour.

Boric acid, soothing and weakly antiseptic, either as a dusting powder, a solution (see page 204), or an ointment (a dram per ounce).

Zinc oxide, soothing and weakly antiseptic, either as a dusting powder or an ointment (a dram per ounce).

Menthol, soothing as an ointment (10 grains to the ounce). Usually added extra.

Resorcin, moderately stimulating and moderately antiseptic, either as an ointment (20 grains to the ounce) or in solution (20 grains to the ounce of weak alcohol, bay rum, *et cetera*).

Salicylic acid,—the same as resorcin.

Sulphur, moderately antiseptic, as an ointment (a dram to the ounce) or as a supersaturated solution.

Mercury, a moderately powerful antiseptic, as the official mercurial ointment.

Ammoniated mercury, a moderately powerful antiseptic, as an ointment (15 grains to the ounce).

Tar, strongly stimulating and a moderately powerful antiseptic, as an ointment (30 to 60 grains per ounce).

Oil of cade,—the same as tar.

Tincture of iodine, strongly antiseptic.

Carbolic acid, soothing and strongly antiseptic, in 1 per cent. solution.

Bichloride of mercury, strongly antiseptic, in one-tenth of 1 per cent. solution.

In addition to these drugs, the skin may be treated by *heat, cold, sunlight,* the *X-ray, et cetera.*

SPEECH.

By the term "speech" may be meant either the *manner of articulation* or the *degree of intelligence* indicated by the words spoken. The latter is really *language*. Parallel in double definition is the term "writing," which may mean either handwriting (chirography) or the intelligence or literary style indicated by the words written.

The Mechanism of Speech.

The mechanism of speech is complex.

(*a*) First, the speech center is stirred by the sense of *hearing*, or of sight, or of touch, or possibly by silent thought alone. The sense of hearing, it may be noted, is very important to the development of speech, since the normal little child hears the speech of others and learns by imitation.

(*b*) In the *brain* the speech process is complex enough to warrant special description. The center in which the *memory of how to speak words* is stored is in the third frontal convolution, on the left side in right-handed people (Broca's region). From here impulses go to the motor region of the cortex (along the fissure of Rolando), and thence to the nerve centers governing the seventh, ninth, tenth, and twelfth cranial nerve nuclei. The nuclei of these nerves (situated in the medulla) in turn transmit through the seventh, ninth, tenth, and twelfth "nerves" impulses to the face, larynx, diaphragm, and tongue. These muscles upon being properly stimulated move and produce speech. The speech sounds are finally perfected by the pressure of the lips against the palate and the teeth, and by resonating the sounds in the vault of the pharynx and nose.

Broca's region itself may be stimulated in a number of ways: 1, the individual may be quietly thinking and suddenly decide to speak. Here the impulse *originates entirely within the brain*, the idea and the will power coming to Broca's area possibly from the frontal regions; 2, the individual may be *incited*

to speak by hearing sounds—possibly words—addressed to him. These sounds are first *received* by the ear and the auditory nerve center, then *perceived* and *understood* in the temporal lobe, where the memories of the meanings of words (third temporal convolution) and the memories of the meanings of sounds generally (first temporal convolution) are stored. From here impulses go to the frontal (?) region, where thought and willing reside. After the thought and the will to speak exist, Broca's region is stimulated, and then the other centers, in the sequence before described, or, 3, the impulse received may be a *sight* impulse, which then is successively received, perceived, and understood (in other brain regions) in a manner similar to hearing impulses. So deaf persons are taught to speak, perforce, by seeing the lip motions of others rather than by the hearing and imitating of word sounds; finally, 4, the impulse may be a *tactile impulse,* successively received, perceived, and understood. Such a succession of impulses is stirred up when one exclaims after striking the foot against an object in a dark room. Helen Kellar, who is both blind and deaf, was forced to learn to speak (and read and write) entirely through the sense of touch.

(*c*) The muscles used in producing speech are (1) the diaphragm and the muscles of the larynx, which produce the sounds afterward made into speech, and (2) the muscles of the tongue and lips, which produce the consonant and vowel sounds.

(*d*) The nasopharynx and nasal chambers produce resonance of the sound; otherwise, flat and wooden in quality. When the nose is stopped up from cold or from adenoids resonance is lost. The palate, which is the roof of the mouth, also acts as a resonator of the sound waves passing out of the mouth, and both the palate and the teeth are pressed against by the tongue to produce certain of the sounds ("d," "t," *et cetera*).

Defective Speech.

A. Defective Intelligent Speech (Thoughts Expressed).

Speech in the sense of *language* has already been mentioned in the chapter on mental deficiency—the age at which the child

learned to talk being indirect evidence, and the thoughts expressed being direct evidence of the condition. This does not mean, however, that the mentality of the child is forthwith dropped from consideration. Far from it, for defective articular speech, next considered, is frequently caused by mental deficiency, and among the feeble-minded of imbecile and idiot grade defective articulation is really a characteristic.

B. Defective Articular Speech.

Defective articular speech is produced by defect or disease of, 1, the ear; 2, the brain; 3, the muscles of the larynx, tongue, lips, or diaphragm; 4, the resonating nasal chambers and nasopharynx; 5, the palate and the teeth.

Disease or defect of the ear entails deafness. Without the ability to hear words the young child is unable to reproduce them unless specially and patiently trained, and deaf-mutism will result.

Disease or defect of the brain may be either (*a*) general mental deficiency which produces slovenly word articulation in common with slovenly muscular movement in other parts of the body; (*b*) some local disease (tumor) in that part of the brain governing the speech, and producing thereby aphasia, apraxia, aphemia, and anarthria,[1] conditions so rare as not to warrant consideration here; a poor development of the speech centers from simple carelessness rather than from inherent defect,—seen in children who talk "baby talk" or who by reason of ignorant, illiterate parents of small vocabulary use only a few words expressed in a slovenly manner.

Disease or defect of the muscles of the larynx, tongue, or lips is usually due to paralysis and practically never occurs in children except those few who by reason of cerebral paralysis (pages 346 and 366) are also feeble-minded. Spasmodic action of the diaphragm, a functional nervous disorder, produces *stammering.* Here the trouble is a nervous constitution plus (usually) some focus of reflex irritation, such as adenoids, which makes the respirations uneven and jerky.

---

[1] Certain of the organic nervous diseases found in children, such as hereditary ataxia and disseminated sclerosis, may produce slightly defective speech. They too are rare.

Disease or defect of the nasal chambers or nasopharynx practically means adenoids and its resulting nasal catarrh. Here the child finds difficulty in pronouncing several of the sounds, notably "m" and "n." "Sprig is cobig" is a phrase designed by some humorist to express the results of a cold in the head. In many small children with adenoids the voice is so wooden and the different sounds so poorly formed that the speech is almost unintelligible. The defective hearing so often accompanying adenoids tends to make the speech still worse.

Disease or defect of the palate or of the teeth means poor pronunciation of sounds. The child with a cleft palate cannot pronounce "t" or "d" well. Luckily the infant without teeth is not called upon to talk.

Diagnosis.

In more than 9 cases out of 10 the diagnosis rests on the existence of deafness, or adenoids, or general mental deficiency. Deafness and adenoids may be easily determined. Whether the child has defective articular speech because of feeble-mindedness or simply from slovenly speech habits is easy to decide in some cases, but in others requires the experiment of two or three weeks' careful teaching to determine.

Stammering, of course, diagnoses itself. There is nothing else with which it may be confounded. It may, however, in rare cases, be due to cerebral paralysis rather than simple nervous disorder. In such case the paralysis is evident to the observer.

Treatment of Defective Articular Speech.

Treatment of Stammering.

The treatment of stammering is primarily along hygienic lines. Adenoids should be removed, needed eye-glasses provided, and fresh air and exercise calculated to improve the general health and reduce nervousness secured. Next the child should be taught to breathe properly—slow, steady inspirations, full expansion, and slow, steady expirations. He should talk slowly and be instructed to stop talking rather than stutter.

Some cases are easily cured, some hardly improvable at all because of the nervous constitution and the long-formed habit.

The majority are much improvable, but liable to recurrence of the stammering when excited.

The Treatment of Defective Sound Formation.

As we have said, a majority of cases are nothing worse than bad speech habits due to adenoids and parents' carelessness. A few minutes' instruction in the production of two or three sounds usually settles the question.

Whatever the cause, and however easy or hard the cure, the training is along the same lines—systematic instruction in the production of the elementary sounds, first singly and then in combination. A chart, or, far better, a teacher experienced in the work, is necessary to cover the field thoroughly. Such a chart, abbreviated from the one used by Dr. Hudson Makuen, of Philadelphia, is here presented:—

Vowel Sounds.	*Coalescent Sounds.*
*a*le, *a*t, *a*lms, *a*ll, *a*sk	f*ar*, f*are*, h*ere*, h*er*,
*e*ve, *e*lk	f*ore*, f*or*, p*oor*, p*urr*
*o*ld, *o*n	
*oo*ze	
(l)*oo*k	
*i*t	
*u*p	

Combination Sounds.

*Ch*urch, *j*ust, bo*x*, e*x*ample, *qu*een, obli*que*, *i*ce, *u*se, f*ire*, f*ir*, p*ure*, *oi*l, *ou*t, h*our*.

The above sounds once mastered, the subsequent efforts of the teacher are directed toward their combination into syllables. Each consonant is combined with every vowel sound,—first preceding it, then succeeding it. Finally words are formed by the union of the mastered syllables. The various books on speech training give suitable lists of such words.

When defective speech is the result of mental deficiency, the speech training may be used as a means of improving the mentality as improving the speech itself. This is because the mind is exercised whenever muscles are exercised,—a truth pointed out in the chapter on mental deficiency in connection

with the improvement of deficient children by manual training, speech training, and general physical education.

Consonants.

	Voiceless oral.	Voiced oral.	Voiced nasal.	
Labials	P. Wh.	B. W.	M	*P*aul *B*rown *m*ade *wh*ite *w*ax.
Labio-dentals	F.	V.		*F*ull *v*oice.
Linguo-dentals	Th.	Th.		*Th*ink *th*ou.
Anterior Linguo-palatals	S. Sh. T.	Z. Zh. D. L. R.	 N.	*S*ome *z*ea-lous *sh*eep lei-*s*ure-ly *t*ook *d*own *n*ine *l*arge *r*ails.
Posterior Linguo-palatals	K. H.	G. Y.	Ng.	*C*an *g*irls bri*ng* *h*ome *y*east.

INFECTIOUS DISEASES.

THIS chapter is intended for non-medical readers rather than for physicians, as it is too elementary in character to offer much to the latter. It aims to make clear the agencies that favor, and that protect against, disease; to emphasize the small number of the acute contagious diseases and their distinguishing features, so that the teachers will be encouraged to familiarize themselves with them, and to emphasize the possibility that long-continued ill health may be due to chronic infection—usually tuberculosis or (in the Southern States) hookworm disease.

The invasion of the body by disease organisms is termed *infection.* Usually the disease organisms are germs of only microscopic size, but it is customary to also use the term "infection" in referring to the visible skin parasites, such as the head-louse and the itch-mite.

An infectious disease is also *contagious* if it is very readily transmitted from one person to another. The older conception of the term contagious was capability of transmission through the air, or by adherence to clothing. We now know so many degrees of transmissibility between "contagious" and "non-contagious" that the term "mildly contagious" has come into use. Today "non-contagious" means that an entrance can be obtained only through infected wounds or through infected food.

In regard to their duration infectious diseases are classified as *acute*[1] (self-limited) and *chronic* (indefinite in duration).

The most frequent and important infectious diseases[2] of children of school age are:—

Acute sore throat.	Chicken-pox.
Diphtheria.	Mumps.
Scarlet fever.	Whooping-cough.
Measles.	Syphilis.
German measles.	Tuberculosis.
Small-pox.	Hookworm disease.

[1] The reader will note that the term "acute" is used in the sense of time duration, and also in the sense of sharpness or intensity.

[2] The parasitic skin diseases, pediculosis, scabies, and ringworm, are considered in the chapter on Skin Diseases.

THE CAUSATION OF INFECTIOUS DISEASES.

The virulence of the germ, the transmissibilty of the germ, and the resistance of the individual to the germ are the three fundamental factors which determine the occurrence of infectious diseases.

1. The Virulence of the Germ.

That the germs of the different diseases attack man with different virulence is familiar knowledge, but it should also be remembered that the germ of each disease varies greatly in virulence at different times. Those in charge of municipal hospitals for contagious diseases notice that different epidemics of small-pox, scarlet fever, or measles vary in the average severity as well as in the number of cases. In some of these epidemics the mortality is more than twice that of others. Laboratory experiments have shown that certain germs can be increased in virulence by inoculating certain animals with them, and then inoculating successively several other animals of the same species from the first one. Thus the virus of rabies (hydrophobia) is made stronger by inoculation successively through a series of rabbits. On the other hand, the exposure of the virus to sunlight decreases its virulence. The saliva of healthy persons contains myriads of germs, many of which are apparently the germ of pneumonia. Occasionally a germ is also found which is apparently that of diphtheria. Whether these germs, here innocuous, are only "poor relations," or degenerate descendants, or temporarily weakened germs of the diseases mentioned is not certain. All these phenomena, however, demonstrate that germs have a maximum and a minimum vigor at different times, just like the higher forms of life.

The seasonal variation in the number of infectious diseases, later discussed, is probably due in some part to corresponding variation in germ virulence. Certain it is that vaccine virus, kept in a warm place,[1] loses its life in two or three days. This

[1] This fact does not appear to be generally appreciated by the medical profession. Vaccine virus kept in the pocket, or on the warm top shelf of a drug store, is soon worthless. The writer learned this from experience in his service as a health inspector in Philadelphia.

corresponds to the decline in number and virulence of small-pox cases in the warmer seasons of the year.

Insanitary conditions probably increase germ virulence, although the numerous germs present in dirty houses and filthy puddles are dangerous to human kind principally because of their greater number. However, when we remember that sunlight is the greatest agent in the destruction of germs we realize that lack of it is at least relatively a condition favoring germ life and activity.

Transmissibility of the Germ.

Germs vary greatly in the facility in which they are transmitted from one individual to another. Generally speaking, those germs which are airborne or which are very likely to be carried upon clothing, after short exposure, are termed "contagious." Those diseases the germs of which are not carried through the air, but which require transplantation into the individual by means of infected food and drink or by means of wounds of the skin, are termed "non-contagious." Examples of the first are seen in small-pox, chicken-pox, measles, scarlet fever, diphtheria, mumps, and whooping-cough, the latter four being much less contagious than the first three. Examples of non-contagious disease are: typhoid fever, which is transmitted by polluted drinking water or milk; hookworm disease, which often is transmitted by wounds of the feet, and malaria, which is transmitted by the bites of infected mosquitoes. Some diseases are classed as mildly contagious, their transmission being effected by long-continued proximity to infected persons or articles. Tuberculosis is a good example of this. Trachoma, which is frequently mentioned as mildly contagious, hardly comes under this definition, as transmission in its case is effected by the habitual use of towels infected by some other member of the family. In such case it would rank with typhoid fever, which is frequently transmitted to hospital nurses by soiling of the hands and subsequent carelessness in hand disinfection.

The contagious diseases, while particularly dangerous because of their ability to travel through the air, are just as able to use the slower routes of the non-contagious diseases. Thus scarlet fever has been transmitted by milk (see page 535), and

tuberculosis is frequently transmitted by infected milk or meat. In children tuberculous infection through the medium of food is the ordinary method, the tubercle bacillus being of the bovine variety.

As to the different methods of transmission the most frequent, with examples of each, are the following:—

1. *Exposure to Infection in the Open Air.*

Scarcely any disease is capable of transmission under such circumstances, small-pox and measles apparently having the power to do so in a small number of cases.

2. *Exposure to Infection in the Sick-room.*

Such exposure is capable of transmitting any of the contagious diseases, the danger of infection varying greatly in different diseases. It is greatest in the case of small-pox and measles, somewhat less in chicken-pox, still less in scarlet fever and diphtheria, less again in case of mumps and whooping-cough, and least in tuberculosis. In the last-named disease exposure for considerable time, weeks at least, is usually required to transmit the disease to a person of ordinary habits and health.

3. *Exposure to Infection in the School Room.*

This method of infection is the most common of all, although, owing to the lack of evidence in the majority of cases, it is one of the least apprehended. Diphtheria, measles, chicken-pox, mumps, and scarlet fever usually are contracted in the school room.

In the case of diphtheria the writer made an investigation of 55 cases occurring consecutively in the Twenty-ninth Ward of Philadelphia, in the year 1905,[1] and found that 11 occurred certainly, and 3 probably, from school contagion. This bare statement, however, does not reveal the whole truth, since 5 of these cases attended a kindergarten in which occurred 4 other cases living in adjoining wards. In the John Sartain Public

[1] "A Study of Contagion," by Walter S. Cornell, M.D., New York Medical Journal, Dec. 23 and 30, 1905. This article is more freely quoted elsewhere (pages 529-546).

School, Philadelphia, in the year 1904, an epidemic of diphtheria totaling 17 cases with 4 deaths occurred.

In the Camac School in 1907, 4 cases occurred in two days. These epidemics were in the writer's personal experience. The papers of Dr. Solis-Cohen, mentioned later, refer to similar ones.

In the case of measles school epidemics are the usual mode of transmission, although the disease is so contagious that it would occur in any event. During such a school epidemic the investigator who walks into a primary grade class room may often detect half a dozen cases at once by the sneezing due to the draught from the open door. In the four lower grades one epidemic succeeds another every few years, as the past sufferers are promoted and new children come in. This fact, by the way, bears upon the exclusion rule for measles. Assuming that every young child contracts measles (and practically every one does), there is little use in excluding brothers and sisters who are over 10 years of age, as their classmates, like themselves, have already had the disease.

As to chicken-pox, the first and second school grades and the kindergarten are principal foci of transmission. This is proven by the fact that the greatest number of cases occur between the ages of 5 and 8 years and by the epidemics in the actual experience of every teacher and inspector. I have several times found 6 or 7 cases of chicken-pox in one room, the children having paid but little attention to the disease and having continued in school. Chicken-pox, because of the predilection of the rash for the body, rather than the face and hands, may readily be missed by the teacher, even though she is aware of an epidemic. The loosening of the neckband of the shirt of a small child readily gives the opportunity for proper examination.

Mumps appears not only in mild school epidemics, but in severe epidemics in institutions. As a rule, in a school of 600 children there may be 10 or 15 cases. In the poorer districts, where the children do not stay home on account of minor ailments, the cases are actually found in the schools. The accompanying illustration shows 6 children with mumps found in one afternoon in the John Hay School, Philadelphia.

Scarlet fever transmitted in the school occurs quite frequently. While the theory of infection from the desquamated

skin of convalescent cases is under attack at the present time, there are so many instances positively known in which the search for the cause of a recent case of scarlet fever has resulted in the discovery of a child with desquamating hands in the same school room that the writer, for one, will continue to believe in this method of transmission until it is disproved. Transmission of scarlet fever from one throat to another when it occurs implies

pk. day.

Fig. 186.—School children with mumps. (School epidemic Hay School, Philadelphia.)

contagion during the early stage of the disease. Such early transmission together with the short period of incubation produces cases in very rapid sequence. The occurrence of cases far apart in time apparently are those contracted from desquamating skin.

Illustrative of a rather extensive epidemic of scarlet fever, one may be cited which occurred in the Camac School, beginning in January, 1908, and continuing until the middle of March. The school house was disinfected twice during this period (February 10 and March 16).

Scarlet-fever cases.

1. Josephine M——
2. Madeline M—— (sister).
3. (Servant girl in house of 1 and 2.)
4. Norah McC—
5. Frances T——
6. Florence H——
7. Jeannette R——
8. Louise McK——
9. Katherine McD——
10. (Cousin of 9 in another school —same milkman.)

Total, 8 cases in Camac School; 2 elsewhere.

Cases who upon subsequent investigation testified to sore throats during the epidemic.

1. Elizabeth E——
2. Ethel G—— (severe).
3. Helen S—— (severe).
4. Mary D——
5. Mary D——
6. Marian S——
7. Florence B——
8. Mamie A——
9. Emma M——
10. Gertrude M——
11. Florence N——
12. Nellie R——

Total, 12 cases.

A scarlet-fever epidemic like this and the records of throats infected by the diphtheria bacillus, mentioned elsewhere, are startling evidence of the risk of contagion in the school house.

4. Neighborhood Infection.

This very often is nothing more than infection through the school room or infection in some house where children have gathered together to play. There are certain cases, however, in which several cases of disease have occurred in a neighborhood without evidence pointing particularly to the school, the home, the food supply, the milk supply, or the house drainage. Although doubtless these neighborhood epidemics are really referable to the just-mentioned agencies, it is impossible to do more than mark them as neighborhood occurrences. In the case of extremely contagious diseases such as measles practically all of the young children in a single block may be infected at the same time, the mode of transmission in the poorer districts being neighborly intercourse between the women. In the case of diphtheria I am inclined to believe that poor sanitation is a factor. The series of 55 diphtheria cases investigated by the writer (already mentioned in connection with school infection) showed upon charting them topographically that three localities harbored most of the cases. This is seen in the accompanying

illustration taken from the *New York Medical Journal,* December 23, 1905.

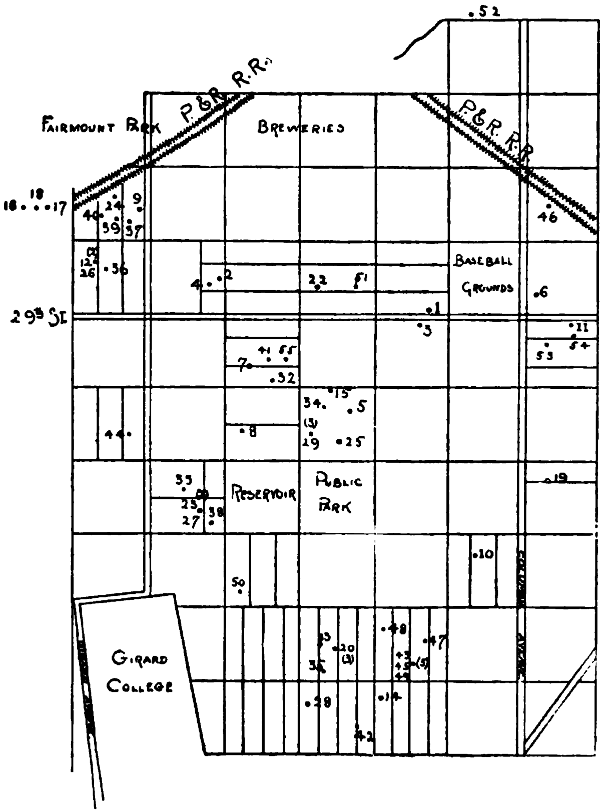


Fig. 187.—Showing three neighborhood epidemics of diphtheria. Western district of Twenty-ninth Ward, Philadelphia, showing streets, location of dwellings, and chronological order of 55 diphtheria cases reported, March-October, 1904.

5. *Infection from Germs Carried in the Throats of Apparently Healthy Persons.*

The throats of healthy children may carry the germs of diphtheria and pneumonia, and also the common staphylococci and streptococci, which produce ordinary tonsillitis. In a recent article on "Diphtheria Bacillus Carriers" (*Journal American Medical Association,* March 19, 1910), Slack, Arms, Wade, and

Blanchard give the results of 8118 cultures taken from the 4500 school children in the Brighton district of Boston. With the exception of a few children who refused, every child had two cultures taken, the second a week later than the first. Results showed that 102 children harbored in their throats bacilli which were either diphtheria bacilli or bacilli indistinguishable from diphtheria bacilli by simple microscopic examination. This proportion, $1^{19}/_{100}$ per cent., is minimum because two cultures naturally do not reveal every diphtheria bacillus in a child's throat. Three hundred and seventy-two secondary cultures were afterward received from the infected throats, with 147 positive cultures. Some of the children showed the diphtheria bacilli for several weeks, but, as a rule, the germs did not appear to remain long in the throat of any one child, many of the children showing them on the first general examination failing to show them on the second and *vice versâ*.

The "carrier" germs do not appear to give rise to diphtheria in the children who act as carriers, for in the above series it is recorded that "these carrier cases have been closely watched, and not one had been ill, nor has any case of diphtheria been traced to them."

The presence of diphtheria bacilli in the throats of *brothers and sisters* and of the class mates of children suffering with diphtheria has been demonstrated by Solis-Cohen,[1] Pennington,[2] McDonald,[3] and many others. Of these, Solis-Cohen's experiments were the most extensive, being carried out in orphanages and homes, public schools, and private dwellings. From his article, which comprises some 20 pages, only the briefest summary can here be given:—

The healthy inmates of several *homes for children* were examined bacteriologically during nine different outbreaks of diphtheria, as many as 124 being examined on one occasion and as few as 2 on another.

---

1 "Diphtheria Carriers; their Discovery and Control," Journal of the American Medical Association, Jan. 9, 1910. "Latent Diphtheria, a Public Health Problem," Penna. Med. Jour., 1907, page 971.

2 "The Virulence of Diphtheria Organisms in the Throats of Well School Children and Diphtheria Convalescents," Jour. Infectious Diseases, Jan. 1, 1907.

3 "A Record of Ninety Diphtheria Carriers," Lancet, March 25, 1911.

Altogether 269 individuals were examined, of whom 35 were found to harbor germs. The proportion infected was, therefore, 13 per cent. On several occasions children suffering from sore throat were examined, and 62.5 per cent. of these proved to be latent diphtheria.

In eleven *private dwellings* where one of the family was sick with diphtheria, the (40) healthy inmates were cultured and 55 per cent. of them found to be infected. In some cases the whole family showed the diphtheria bacilli. In four of these houses 10 were found to suffer with slight sore throat. In 9 of the 10 cases (90 per cent.) this was found to be due to the diphtheria bacillus.

In a *block* where several cases of typical and latent diphtheria had occurred, three children who were suffering from sore throat were examined, and two of these proved to be latent diphtheria.

Dr. Solis-Cohen's work in the case of *school epidemics* (as given in this paper) is limited to 23 cases, who had been in contact in a class room with a child convalescent from latent diphtheria. Only one child was found to be infected. He states that, according to Graham-Smith, the proportion of children in infected schools who harbor diphtheria bacilli is 8.7 per cent. The writer on one occasion took a culture from each of the 42 children in a primary class in the Camac School, Philadelphia, owing to the occurrence of 4 cases of diphtheria in the course of two days. Twelve of the supposedly healthy children showed the diphtheria bacillus. A prompt notification of the parents with advice to seek a physician or at least to use a douche or gargle averted further cases.

Slight sore throats, which are in reality mild cases of diphtheria, exist in great number in school children. The condition is mentioned by Solis-Cohen in his paper, and has been written of frequently by public health officials. In a similar manner slight sore throats which are really cases of mild scarlet fever may pass unnoticed by teachers and parents and carry disease to numbers of other children.

6. *Infection by Germs Carried on Clothing, Domestic Animals, et cetera.*

In former years the clothing was the only carrier suspected, and its disinfection or destruction was considered sufficient health insurance for those not in actual contact with the disease. Since then the microscope and the investigations of health

authorities have shown many other sources of contagion, and the removal of food, money, or mail matter from houses harboring contagious diseases is now officially prohibited.

Cats, dogs, canaries, and chickens, which often come into intimate contact with members of a household, may well carry infection in their fur, or their feathers, or possibly in their throats. A press dispatch April 25, 1911, at hand, states that the Health Department of Buffalo ordered the official execution of a cat in whose throat diphtheria germs had been found by the city bacteriologist. Suspicion had been directed to this cat because diphtheria followed it from its original home, in which there were 2 cases, to a neighboring home, to which it had been sent for temporary care.

Hospital authorities make it a rule to allow no dogs or cats in their medical wards because of the possibility of the transmission of disease.

7. *Infection by the Desquamating (peeling) Skin of Scarlet Fever Convalescents.*

This method of infection has already been mentioned in connection with contagion in the school room. The scabs of chicken-pox (and small-pox) likewise carry disease.

8. *Infection by Physical Contact with Infected Persons or Things.*

The diseases transmitted by the handling of infected objects are trachoma, which is rubbed into the eyes by dirty, infected hands or towels; tuberculosis, when it is implanted by reason of careless handling of the sputum of a consumptive, or the pus from a tuberculous abscess; typhoid fever, by reason of careless handling of toilet articles (and subsequent contamination of food); gonorrhea, which is not only a venereal disease, but also may infect an infant's eyes at the time of birth, or any person's eyes through the medium of a soiled, infected towel; hookworm, which is found in the larval form in the soil of the Southern States, and is easily taken into the mouth by children and laborers with dirty hands.

Syphilis may be contracted innocently as well as gonorrhea. In its secondary stage (with general eruption and sores in the mouth) it is highly infective to anyone coming in physical contact, especially if the skin of that part exposed is thin, such as the skin of the lips. Here is one of the hygienic arguments against promiscuous kissing between those of the same or opposite sex. In the *Journal of the American Medical Association*, September 2, 1911, Dr. Jay M. Schamberg reports an instance in which 7 young people were infected with syphilis by reason of indulgence in a kissing game:—

> The following epidemic is a distressing instance of the innocent transmission of syphilis:—
>
> A coterie of young men and women, varying in age from 16 to 22 years, gave a minstrel performance as a benefit. Following this, a party and later a banquet were given, at which juvenile kissing games were indulged in. One of the participants, a young man of 22, had a sore on his lip, the nature of which he avers he did not know. Six young women kissed by him developed chancres of the lip. A young man present at the affair likewise developed a chancre of the lip apparently from the virus deposited on the lips of one of the young women, for he did not come ihto contact with the original source. In addition, a young woman kissed by the offender at a third social function likewise developed an initial sclerosis, making in all eight labial chancres from the one source.
>
> The original offender was apprehended by a detective and brought to the health department quarters in City Hall. I examined the young man and secured the following history: The patient first noticed a sore on the left side of the lower lip about February 12, 1911; March 3d, he consulted a physician, who, according to the statement of the patient, did not inform him of the contagious nature of the lesion. The physician on being interrogated declares that he advised the young man to take all precautions; there is, therefore, a question of veracity between the patient and his physician.

9. The Transmission of Disease by Drinking Water and by Food.

Such transmission is well recognized, but most of the diseases so carried (typhoid fever, dysentery, cholera, *et cetera*) are not germane to our subject. The hookworm, so common in the South, is often transmitted by food or drink that has been contaminated by the larvæ developed in the soil. Although a minor matter, it is well for mothers to know that most cases of intesti-

nal worms (the ordinary "seatworm") are caused by the eating of half-cooked oatmeal.

10. Transmission by Milk.

In milk the germs of disease find a favorable medium for growth, and consequently the milk supply under present conditions constitutes one of the greatest dangers to the community. Typhoid fever, scarlet fever, diphtheria, tuberculosis, and streptococcic infection have all resulted from infected milk. Because of tuberculosis thousands of cattle are condemned every year by State inspectors. Tuberculosis in children is usually due to infected milk because the intestines are frequently affected (rather than the lungs) and the tubercle bacillus is of the "bovine" variety. Epidemics of typhoid fever from contaminated milk are so common in the experience of health boards that efficient inspectors keep a record of the milk supply of the infected house as a routine procedure. In my own experience as a medical inspector, a milk dealer disseminated typhoid fever among some twelve customers in different houses by reason of his wife waiting upon a sick son, and also handling milk in the store. The sickness proved to be typhoid fever, diagnosed pneumonia by the attending physician, and only discovered by the circumstantial evidence. In another instance known to the writer, a farmer at Devon, Pennsylvania, entertained a case of typhoid fever unawares in the person of his hired man, and the result was 17 typhoid fever cases, with 4 deaths, among his milk customers. As to diphtheria, Nothnagel's "Encyclopedia of Medicine" cites quite a number of epidemics in which the milk was the medium of transmission. Scarlet fever is occasionally carried by milk, with widespread epidemics resulting. At hand are two reports on such epidemics. One was in Chicago[1] and numbered 2000 cases. A special investigation at Evanston (a Chicago suburb) showed that a certain large milk firm supplied practically all the families in which the disease occurred. A diversion of the milk from Evanston to Chicago because of loss of trade was marked by the epidemic in the main city. It

[1] "The Scarlet Fever Epidemic of 1907," H. B. Hemenway, M.D., Jour. Amer. Med. Assoc., April 4, 1908.

transpired that three cappers in the bottling plant of the milk company had had scarlet fever—one of them working while the skin of his hands was still desquamating (peeling). The Boston[1] epidemic included some 700 cases. In 84 per cent. of them the same milk company was patronized. The most probable source of infection, after investigation, was a taster in the bottling plant.

A small epidemic occurring in Collingswood, New Jersey,[2] is interesting because it originated from milk bottled given back to the dealer from an infected house. Sixteen cases resulted. Incidentally, it may be remarked that this milkman did not wash and sterilize his bottles as he should have done.

11. Infection by Wounds and Bites.

The germs of some diseases secure entrance to the system through wounds of the skin. The germ of tetanus (lockjaw), which is found in garden earth, is an example, as is also the larva of the hookworm. In the East bubonic plague is often caused by the bites of fleas from infected rats, and certain varieties of mosquito infected by malaria or by yellow fever transmit these diseases to man by their bites.

12. The Common Drinking Cup.

The common drinking cup is a prolific source of germ transmission, and, while the bits of epithelium and a majority of the germs adherent to the rim are not virulent, its use is far from safe. It certainly is an unclean thing. It has been prohibited by law in the State of New Jersey, in Chicago, and in New York City. The *Journal of the American Medical Association,* September 2, 1911, devotes a page in seriocomic vein to the subject. Passing by the description of Erie Railroad brakemen hiding and restoring the cups at the boundary line between New Jersey and New York, because of opposite legal requirements, the following extract from the Bay City (Mich.) *Times* may be quoted:—

[1] "An Epidemic of Scarlet Fever in Boston, Cambridge, Somerville, and Everett," Massachusetts Health Bulletin, March, 1907.

[2] "Scarlatinal Epidemic from Infected Milk Bottles," Harold B. Wood, M.D., New York Med. Jour., Dec. 19, 1908.

There is no dodging the issue. The private cup is the cup of peace. It is a movement in the direction of health. It is the outgrowth of a condition which medical science has demanded as a safeguard.

And yet some people are heard objecting to the removal of the drinking cup from railroad trains and other places. If the public cup is a convenience, why not have a public handkerchief, a public towel, a public toothbrush, and a public manicure set? One is as reasonable as the other, when you get down to brass tacks.

Some city boards of health and some common councils that have not yet advanced very far in medical jurisprudence are holding back. The public drinking cup is an old friend, and they are loath to part from it. It has served Tom, Dick, and Harry, has accumulated germs and microbes, and a rare selection of tobacco juice, onion odors, contaminated saliva, and what-not, and it ought to be respected. . . . Those boards of health which have made a study of the dangers connected with the promiscuous use of a cup are really getting so far advanced in their way of thinking that it may become advisable to hold a school of instruction or a conference, so that the kickers against abolishing the public cup may be heard on this very important question. At such a school, the kickers might also have an opportunity for advocating the public toothbrush and the public towel, and especially the public handkerchief, all of which are closely related to, and allied with, the public drinking cup.

Vital Resistance.

Under this heading may be considered both the methods by which the germs of disease are fought by the body and those factors familiar to all of us which influence the body mechanism in its constant invasion by the lower forms of life.

As to the biochemical reactions of the body little is certainly known. Germs may be destroyed by the leucocytes (phagocytosis), which devour them. The ability to do so is measured by the so-called opsonic index. Meanwhile, the cells of the body under the attack of the poisons (toxins) produced by the germs themselves produce an antagonistic neutralizing antitoxin. A second substance produced may agglutinate, a third may dissolve the germs (bacteriolysis), so that four methods of germ destruction are afforded. The cells of the body, having produced antitoxin upon the provocation of a certain disease germ, continue to produce it for some time after recovery has taken place. This explains the immunity to a second attack usually seen in those who have had small-pox, scarlet fever, measles, *et cetera*. This immunity, by the way, is very variable

in its duration in different diseases, dying out in a few months in the case of diphtheria, lasting long enough, but decreasing considerably with the lapse of time, in the case of measles or scarlet fever, remaining powerful for many years in the case of small-pox.

The condition of less than average resistance is the opposite to immunity, and has been termed anaphylaxis. As to the biological factors in its causation very little is known, but we do know practically that transgression of the laws of hygiene very materially exposes the body to the germs of the various diseases.

From our knowledge of the action of germs upon the body, and the antitoxins produced by the body, has recently arisen that treatment of disease known as serum therapy. In this are included the vaccines (*e.g.*, against small-pox), the antitoxins (*e.g.*, against diphtheria and tetanus), and the toxins (*e.g.*, tuberculin against tuberculosis, and streptococcus toxins against sarcoma, and antityphoid inoculation).

Immunity or, relatively speaking, lack of immunity to certain diseases exists in different races. Sometimes the lack of immunity is due to the fact that a disease is new to the race. This is illustrated by the severity with which measles attacked the natives of the South Sea Islands when introduced there. Sometimes there appears to exist considerable difference due to race, as, for instance, the greater susceptibility of the negro to tuberculosis and his less susceptibility to malaria, yellow fever, and hookworm. This may be due to the recency of exposure of the negro to tuberculosis—a disease of civilization—and long acquaintance with tropical diseases; or, again, it may be due to insanitary housing, on the one hand, and a tough skin, on the other; or, finally, it may be inherent in the race—not a very scientific reason.

The greater resistance of those who have been vaccinated against small-pox and typhoid fever is well worth noting. In the case of small-pox, vaccination has rid the world of its most dangerous disease, one that previous to the nineteenth century afflicted almost every European, with a mortality of 10 to 30 per cent. It is unfortunate that certain misguided persons, untrained in science, have at different times agitated against universal vaccination on the ground that it is against personal liberty, on the ridiculous statement that small-pox is a form of

syphilis, *et cetera.* The fact that the vaccination principle holds true for more than one disease, that countries rigorously enforcing vaccination laws are free from small-pox, and that in the United States small-pox varies *pari passu* with the laxity in vaccination enforcement, and the fact that the dirtiest sections of our large cities, peopled by foreigners who have been vaccinated by the steamship authorities upon immigration, show no small-pox constitute overwhelming evidence of the efficacy of vaccination. Dr. A. A. Cairns, Chief Inspector of the Philadelphia Bureau of Health, who by his energetic measures has abolished small-pox among the natives of that city, states that the sporadic cases, one or two a year, which occur in Philadelphia are traced to recent arrivals, usually sailors from ships in the port or negroes from the country districts of Virginia.

The protection afforded by (cow-pox) vaccination against small-pox lasts for several years. With negligible exception, the person successfully vaccinated within a period of three years is immune to small-pox. It is a good working rule to perform vaccination before the age of 2 years and subsequently attempt vaccination every five to seven years thereafter.

Certain agencies lower the resistance of the individual to disease.

Of these, *poor nutrition* and *anemia* rank first. Their predisposing influence toward infection by the tubercle bacilli and infection by the ordinary pus germs (streptococci and staphylococci) is well recognized. The lung that has a brisk circulation of good red blood has little to fear. The healthy man suffers little or not at all from skin blemishes, boils, and abscesses. The better resistance of those parts that receive the better blood supply is shown by the facility with which wounds of the lips heal, the blood supply here being very abundant. A modern treatment of infections of local parts (Bier's hyperemia treatment) is the artificial production of an increased blood supply by means of either a vacuum or a slightly constricting bandage above the part.

Defects of the nose and throat, which have been already discussed in their appropriate chapter, expose their possessors to tonsillitis and diphtheria.

The writer can cite many illustrative cases seen in the course of municipal health work. In one a family of 5 children had all had diphtheria at different times over several years. The 4 surviving ones (the patient and 3 others), on inspection, showed tonsils which were enlarged and of unhealthy appearance. One of the children also suffered from partial nasal obstruction. In another instance, an official inspection of the throats of a class of 40 small school children showed 2 with tonsils of this same sort. It happened that these 2 children had both had diphtheria within two years, and no other child in the class had ever suffered from the disease, at least not in the three years previous, during which time the writer would have had official knowledge thereof.

Tuberculosis occasionally begins in diseased tonsils or teeth, and in adenoids. Whether scarlet fever and measles are more likely in children with nose and throat defects is not certain, but secondary infection of the ear, with abscess, is a complication much more likely to occur.

Constipation is a powerful depressing influence and, hence, an aid to the invading germ. In the case of the sore-throat diseases this is an everyday experience. Probably in influenza and pneumonia, the germs of which are plentiful enough, constipation plays a similar rôle.

Fatigue and *exhaustion* lower the body resistance. Exactly how this is accomplished is not certain. Certainly the circulation is not as brisk, and the blood is full of depressing fatigue products from the muscles, just as in the case of constipation the blood contains poisonous fatigue products from the intestines. Children do not catch cold or contract influenza from playing outdoors on winter *mornings*. It is in the late afternoon, when the body tires and the circulation stagnates, that they lose their resistance.

Poor ventilation lowers the body resistance remarkably, by forcing the individual to breathe and rebreathe the fouled air, loaded with germs and deficient in oxygen. When a person states that he has contracted a cold by reason of exposure to cold air he states the case erroneously. He should say in the majority of cases that he has contracted a cold by going into the cold air from a warm, stuffy, foul room laden with germs,

and in a less number of instances that he has gone into the cold outside air when he was tired and stayed there a long while, or that he has sat for a time in a draught. We know that among the Esquimaux pneumonia is almost unknown. Some of these Esquimaux, however, when brought to New York City as exhibits in a show, contracted pneumonia from the ill-ventilated houses used by "civilized" people. The modern treatment of pneumonia in our large hospitals is absolute fresh air, the cases often being put on the porches or on the roof. The section on hygiene ("ventilation" and "fresh-air classes") should be read in this connection.

The Influence of Season and of Sanitation upon the Prevalence of Contagious Diseases.

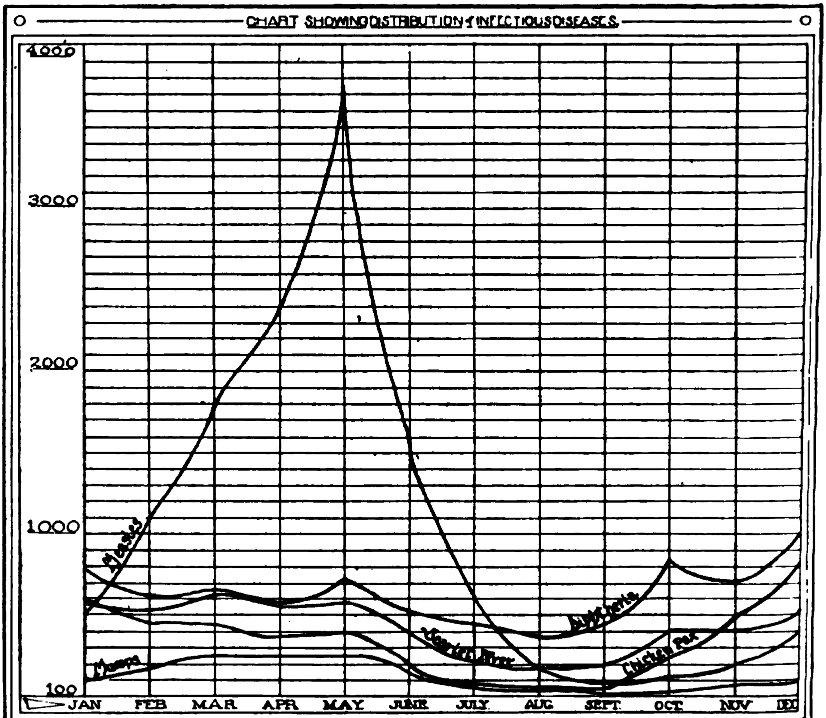
The factors of season and sanitation cannot readily be classified under any one of the three general causes of infectious disease (germ virulence, transmissibility, and vital resistance) because they complexly involve all three. Because of this fact and because of their importance, they are given separate consideration.

The reader will note that contagious diseases only are considered in this connection, because they only are essentially children's diseases. Some of the non-contagious infections, such as typhoid fever and malaria, are even better known to be dependent upon poor sanitation and certain seasonal influences than the diseases next discussed.

Seasonal Influence.

The reports of health authorities show that the contagious diseases of childhood gradually increase in number from September to March or April, then decrease until July, and then suddenly further decrease to their minimum number during July, August, and September.

This general rule holds for diphtheria, scarlet fever, and chicken-pox, and is approximately correct in the case of small-pox and measles. Small-pox is essentially a cold-weather disease, and during an epidemic may be at its height any time during the winter. Measles, which is characterized by bronchitis,



Date.		Mumps.	Measles.	Scarlet Fever.	Chicken-pox.	Diphtheria.
January	'08	51	142	299	235	441
"	09	63	369	274	359	329
February,	'08	84	674	260	183	299
"	'09	99	429	277	260	328
March,	'08	119	1017	325	145	341
"	'09	137	792	306	299	306
April,	'08	127	1606	270	139	270
"	'09	119	830	287	223	319
May,	'08	112	2374	278	183	325
"	'09	145	1378	309	225	406
June,	'08	43	885	207	64	222
"	'09	78	721	199	144	295
July,	'08	19	360	87	28	205
"	'09	26	258	129	53	241
August,	'08	8	111	89	13	190
"	'09	5	57	70	16	192
September,	'08	2	43	110	27	211
"	'09	4	24	93	29	238
October,	'08	12	109	233	120	451
"	'09	17	24	186	125	407
November,	'08	28	153	248	233	418
"	'09	33	51	170	279	312
December,	'08	51	308	250	431	490
"	'09	51	85	284	393	505
Totals		1433	12300	5240	4206	7741

Fig. 188.—Chart showing variations in prevalence of acute contagious diseases by months. (Philadelphia, average for two years.)

sneezing, and coughing, occurs principally in the early spring, but the other months are exceptional to the rule because they show very few cases.

Seasonal influence in the sense of *climatic* influence does undoubtedly exist, and the characteristic appearance of small-pox (in former years) and of measles during certain months is proof of this. In the case of some diseases, however, and particularly in the case of the sore-throat diseases, diphtheria, and scarlet fever, other factors must be considered. Principal among these is the close association of children in the school room during the winter months and probability of a slow spread of disease germs progressively with the school year, or, at least, until the warm weather of April and May causes more outdoor play, less herding together, and the discarding of infected coats and wraps.

The accompanying chart, prepared by Mr. Garrison, one of my students at the University of Pennsylvania, shows the seasonal variation (average figures for two years) of contagious diseases in the city of Philadelphia. The figures are taken from the annual reports of Dr. A. A. Cairns, Chief Medical Inspector of the Bureau of Health.

A very forceful illustration of the regular rise and decline of scarlet fever during each year is presented in a paper by Dr. A. Seibert (*New York Medical Journal,* December 17, 1904), the total number for ten years (1892-1902) being given. Dr. Seibert also shows in this article that the prevalence of scarlet fever is not affected by the density of population, the number of cases bearing a fixed ratio to the total population in all parts of the city. From this he concludes that school contact is the sole method of propagating the disease. This conclusion is hardly justified, since climatic considerations and milk infection are not considered in the article, but it does bring out the surprising fact that insanitary conditions have but little influence on scarlet fever, and also that the school influence is probably the principal one.

The Influence of Sanitation.

That insanitary conditions, such as stagnant pools, collections of dirt, sewage accumulations, lack of sunlight, and lack

of fresh air, favor the growth of germs there is no doubt. The danger of disease by reason of poor sanitation does not rest alone upon an increase in the number of germs. The fly, which finds in the rottenest refuse his choicest food, is glad to go therefrom to the dinner table without wiping his feet. The individual who breathes foul air or hot, dry air (or the two combined) lowers his vital resistance so that the germs conquer not only by their great number, but also by his decreased vitality. This same hot, dry air especially lowers the vitality of the throat (see pages 158 and 260) and thereby makes its possessor especially liable to tonsillitis, diphtheria, and tuberculosis. Hence, it is evident that poor sanitation aids each of the three basic causes of disease: germ virulence, transmissibility, and lowered vital resistance.

Among the acute contagious diseases of childhood the influence of bad sanitary conditions is strongly evident in but one—diphtheria. Small-pox, in the times previous to vaccination, was more prevalent in places of squalor and filth, but, fortunately, vaccination has taken the disease from the list of familiar infections. Scarlet fever, according to Seibert's investigations just quoted, is more frequent in the slums simply because more children exist there, and is not influenced by density of population. Measles is so contagious that in our cities an epidemic simply waits until a sufficient number of young children come into existence, and then sweeps through a neighborhood without particularly needing the aid of the school room and apparently without any relation to the sanitary conditions which happen to exist.

Diphtheria is so essentially a disease of poor sanitation that it here deserves special consideration. Every health inspector knows that the house harboring diphtheria is *usually* the shabbiest in the block, and that the drainage is often imperfect. In the investigation[1] (already mentioned) made by the writer of 55 diphtheria cases occurring in the Twenty-ninth Ward of Philadelphia in 1904, the factor of poor sanitation was even more evident than the factor of transmission through personal contact. The conclusion reached through this investigation was

1 "A Study of Contagion." Walter S. Cornell, M.D., New York Med. Jour., Dec. 23 and 30, 1905.

that, "while poor sanitation is the rule for all cases of diphtheria, it is most constantly and pronouncedly so in those cases arising apparently spontaneously. In cases where good sanitary conditions exist, the source of contagion is usually evident."

Quoting from this article:—

A personal examination of the yard, water closet, cellar, and back alley was made in all of the 55 cases mentioned. Taking the cellar, water closet, and surface drainage as the three principal sanitary factors, an investigation of 137 of them in 48 houses where diphtheria occurred showed that 59 of these items were in unsatisfactory condition. (For details, see chart on next page.)

This remarkable condition may also be demonstrated by noting the next to the last column of the chart. Here it can be seen that of the 48 houses mentioned the sanitary conditions were good only in 12, fair in 17, and absolutely bad in 19. These faults of drainage and sewage were perfectly evident to anyone, and did not require imagination nor prejudice to be condemned.

THE RELATION OF THE GRADE OF SANITATION TO THE EVIDENCE OF DIRECT CONTAGION.

Having ascertained the cases of diphtheria evidently due to direct contagion, and noted those houses where insanitary conditions existed, an attempt was made to correlate these factors.

Accordingly the three groups of cases summarized in the preceding paragraphs on "evidence of direct contagion" (see "*a*," "*b*," and "*c*") were taken, and their respective sanitary conditions (see chart for details) compared with the following result:—

(*a*) General grade of house sanitation found in cases transmitted from known source:—

(Details here omitted.)

Total: Good, 5; fair, 5; bad, 3.

(*b*) General grade of house sanitation found in cases transmitted from source fairly well indicated:—

(Details here omitted.)

Total: Good, 3; fair, 4; bad —.

(*c*) General grade of house sanitation found in cases arising apparently spontaneously:—

(Details here omitted.)

Total: Good, 5; fair, 7; bad, 17.

Compare the totals, and note that in the 20 cases where the sanitation was bad 17 cases occurred apparently spontaneously, and only 3 cases could be traced to contagion from other cases.

Among the mildly contagious diseases tuberculosis, hookworm, and trachoma are particularly favored by insanitary conditions. Trachoma has been discussed already (page 204).

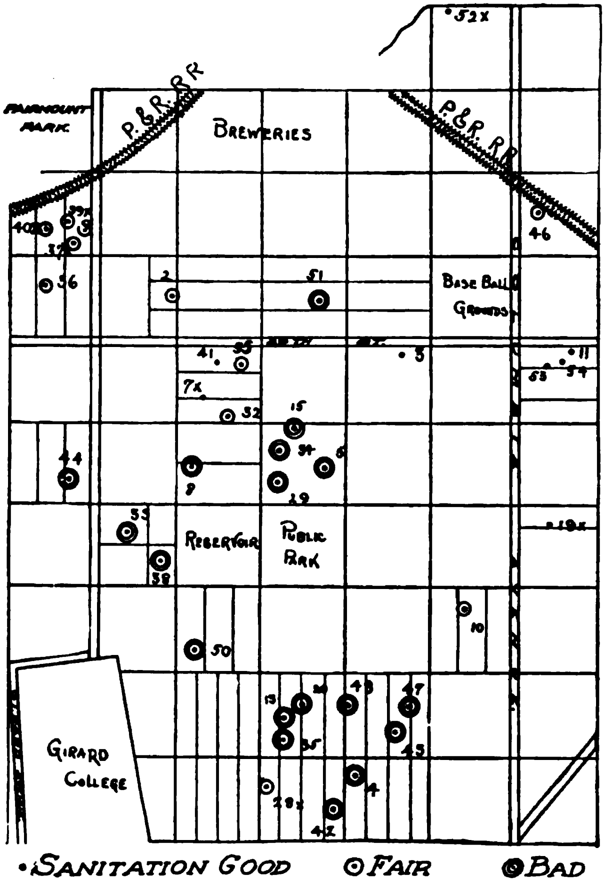


Fig. 189.—Diphtheria and poor sanitation. Chart showing those cases in the series of 55 which originated apparently spontaneously and the grade of sanitation at each infected dwelling. The few cases marked × do not belong to this class, as they had a more or less traceable source of contagion.

Hookworm disease depends almost entirely upon insanitary conditions, since the hookworm develops to maturity only in the human intestine. Proper sewage disposal first, clean hands and

shod feet second, would eradicate the disease in a few years. Tuberculosis is *the* disease resulting from bad hygiene, and among its five favoring agencies, bad air, poor food, lack of exercise, lack of proper rest, and exhaustion from overwork or intemperate habits, the first is one phase of insanitation. In the International Tuberculosis Exhibit at Washington in 1908, the prevalence of tuberculosis in the crowded slum districts and its prevalence among indoor workers (deprived of fresh air) were demonstrated over and over again. In my own city of Philadelphia the death rate from tuberculosis (1908) in the Third and Fourth Wards (poor foreigners in crowded quarters) was 32 and 33 per 10,000, respectively, while in the Twenty-second and Thirty-second Wards (good residential sections) it was 16 and 17.9, respectively. In the outlying Thirty-fifth Ward (suburbs and farms) it was only 12 per 10,000.

THE EVIDENCE OF INFECTIOUS DISEASE.

General Considerations.

In considering an infectious disease, it is well to know:—

1. Its methods of entrance into the system.
2. The period of incubation.
3. Method of onset.
4. Degree of sickness (of malaise, fever, debility).
5. Presence or absence of sore throat.
6. Presence or absence of skin rash.
7. Resulting diseases and defects (complications and sequelæ).

1. *The methods of entrance* into the system have been already discussed in connection with *causes* of infectious disease. In the description of the common diseases the principal method of entrance will be mentioned in each case.

2. *The period of incubation* is the time elapsing between the invasion of the germ and the onset of the disease. During this time the germs are multiplying in the system. A knowledge of the period of incubation is of practical value because the minimum time for each disease (and approximately the maximum time) is constant. Thus the health authorities, confronted by

an outbreak of typhoid fever, know that infection occurred ten to twenty days earlier; that a case of small-pox contracted the disease ten to twenty days earlier; that 2 cases of scarlet fever in the same house, becoming sick two or three days apart, are very possibly related to each other, because scarlet fever has a short period of incubation—from two to five days. The physician knows that a person exposed to small-pox who is immediately (successfully) vaccinated will be protected from small-pox, because the latter requires at least ten days to incubate. A person exposed (often innocently) to syphilis need not look for any manifestation of the disease before the expiration of three weeks, for the disease requires absolutely that time in which to incubate.

It is notable that the sore-throat diseases, acute sore throat, diphtheria, and scarlet fever, require only a day or two in which to incubate.

The following diseases and the period of incubation for each may be noted:—

Acute sore throat	1 to 3 days.
Diphtheria	1 to 10 days.
Scarlet fever	2 to 7 days (oftenest 2 to 4)
Measles	7 to 18 days (oftenest 14).
German measles	14 to 20 days.
Chicken-pox	10 to 14 days.
Small-pox	10 to 20 days.
Mumps	14 to 20 days
Whooping-cough	7 to 10 days.
Syphilis	3 weeks.
Tuberculosis	indefinite (from weeks to years).

3. *The method of onset* may be sudden or gradual, mild or severe. When the onset is both sudden and severe, the disease is ushered in by headache, backache, and great distress. In more severe cases vomiting and even convulsions may occur.

4. *The degree of sickness* is fairly characteristic of each disease, but it should never be forgotten that very mild forms of all the infectious diseases may occur, as, for example, small-pox, scarlet fever, and diphtheria. These typical mild cases may, however, transmit severe cases to others. In a general way the degree of sickness may be judged by the patient's feelings, the degree of fever, and the degree of debility.

5. *Sore throat* exists in simple acute sore throat, tonsillitis, diphtheria, and scarlet fever.

6. *A skin rash* (characteristic in each case) exists in scarlet fever, measles, German measles, chicken-pox, small-pox, and syphilis.

7. *The diseases and defects resulting from the infectious diseases* are many and various. In some diseases, particularly scarlet fever, the kidneys may be irreparably damaged. Heart disease results from scarlet fever, diphtheria, influenza, acute rheumatism, and tonsillitis in quite a large proportion of cases. Scarlet fever, measles, and influenza may produce inflammation and abscess of the ears.

Signs and Symptoms of the Most Frequent Infections of Children.

The most common infections occurring in school children may now be described.

Acute Sore Throat. Tonsillitis.

These have been already discussed in the chapter dealing with diseases and defects of the nose and throat (pp. 246, 249).

Diphtheria.

A sore throat with fever and prostration. The diphtheria bacillus attacks the mucous membrane of the throat (usually on or about the tonsil, but the nose, the pharynx, and the larynx may be the location) and destroys it. The dead mucous membrane, fibrin exudate, white blood-corpuscles, and germs together make a grayish or yellowish patch, the so-called diphtheritic membrane. Scraping this loose causes a raw surface. After several days the diphtheritic membrane sloughs off. The diphtheria (Klebs-Löffler) bacillus is easily found in the throat. The disease is not of definite duration, but the average course is one to two weeks. The disease is prevented by the administration of antitoxin, and the use of this remedy has reduced the mortality from 15 (prior to 1893) to 3 or 4 per cent.

By *latent* diphtheria is meant a mild sore throat caused by the diphtheria bacillus.

Scarlet Fever.

This disease is characterized by a sore throat, a very rapid pulse, onset with headache and nausea, and a diffuse red rash appearing sometimes only on the face and chest. No one of these signs is sufficient for a diagnosis, as all (singly) may be produced by other causes.

At the end of a week the fever and rash have about disappeared. Shortly after the skin previously affected by the rash comes away in fine scales or in good-sized pieces. This "peeling" or "desquamating" is usually complete three and a half weeks after the beginning of the disease.

Measles.

A bronchitis with cough and sneezing, particularly if a draught of air strikes the child. Watering eyes and sensitiveness to light. On the fourth a blotchy, red rash, lasting four or five days. The rash consists of slightly raised, solid lumps, usually in clumps.

German Measles.

This is a very mild disease, characterized by little more than slight illness and a pale-red rash. This rash may resemble that of measles, but in such case is usually paler, or it may resemble scarlet fever, but in such case the goose-flesh appearance usually seen in scarlet fever is lacking.

Chicken-pox.

Like German measles, this is (usually) a very mild disease, and cases in all stages are frequently found in school. In the milder cases the child feels unwell on the first and possibly the second day only. The eruption, which is mainly on the body and may not appear on the face at all, consists of little vesicles containing a fluid, which soon break and produce a drying scab. This becomes harder and darker with age. From the second to the eighth day fresh vesicles appear daily, so that the vesicles, fresh scabs, and old, dark, dried scabs may be seen at one time.

Small-pox.

This disease can hardly be met with in school because the child contracting it would be unvaccinated and such cases are of severe degree. Vaccination will be considered in the paragraph on the treatment of infectious diseases.

Mumps.

Mumps is an inflammation of the parotid (salivary) gland. The swelling is on the side of the face and the jaw,—not *under*

Fig. 190.—School boy with mumps. (Note the rounded swelling at the angle of the left jaw.)

the jaw, although enlarged cervical glands often do coexist. The movements of the jaw are restricted and painful; the duration of the disease is usually five or six days. It is quite contagious.

Whooping-cough.

The course of this disease may be divided into three stages. The first of these, lasting about two weeks, appears to be an ordinary bronchitis. In the second stage, lasting some three weeks, there is the characteristic severe spasmodic cough of long duration, often ending in blueness of the face and vomiting. The eyes and eyelids are often reddened. The third stage lasts from two weeks to several months, and is marked by coughing spells of decreasing intensity and frequency. It is the general belief that these latter paroxysms are more the expression of a

habit than actual disease itself, and that the latter ceases to be contagious after five or six weeks' duration.

Syphilis.

This disease is in the adult usually the result of venereal infection, although it may be contracted through contact of any part of the body with the syphilitic virus. In the ordinary *acquired* syphilis there are three stages: the first being the primary sore (chancre), which appears at the site of infection—usually the genitals—three weeks after that event; the second being a condition of general infection marked by fever, a general skin rash, and superficial ulcers on the mucous membrane of the mouth, appearing about six weeks after the primary local sore and lasting for several days to several weeks with recurrences; the third being a condition of latent infection, the syphilis germs existing stowed away here and there in the body and occasionally causing deep sores, bone diseases, and tumors. This latter stage manifests itself from two to twenty years after the original infection. In addition to these well-defined stages of the disease, all of which are marked by the presence of syphilis germs in the sores and ulcers (and in the secondary stage by the germs in the blood throughout the body), various nervous diseases result from syphilis, the poison having caused degeneration of the nerve-tissue.

Congenital syphilis is syphilis transmitted to a child before its birth, either the father or the mother being syphilitic. In the light of our present knowledge it is likely that the mother is always syphilitic, the father, if he be the guilty party, infecting the child by first infecting the mother. The disease is fundamentally the same as acquired syphilis, the chancre (original sore) having disappeared before birth or not occurring at all because of a primary *general* infection of the child while in the uterus.

The evidence of inherited syphilis in a newborn or month-old infant differs from that exhibited by a school child 6 or 8 years old. In the former the signs are those of active secondary syphilis. A general skin rash may be present, catarrh of the nose, throat, and lungs, gastrointestinal catarrh with diarrhea

and swollen liver, and malnutrition from the indigestion. The cranial bones and the shins may show inflammatory swellings, the bridge of the nose break down, and the teeth come in late (after the twelfth month) and poorly formed. One or both corneæ may be the seat of a diffuse inflammation (interstitial keratitis).

By the time the child has reached school age (if he has not died) the syphilis is passing into the tertiary stage and the germs are few and in hiding. The damage already done is, therefore, the principal evidence. The teeth are often poorly formed, and the permanent upper central incisors are characteristically small, peg-shaped, notched on the end, and liable to decay ("Hutchinson's teeth"). The bridge of the nose may be sunken; extreme malnutrition may be present from chronic indigestion, so that the child looks weazened like "a small, shriveled-up old man." Scars, particularly around the mouth, may be present—from the old skin eruption. Blindness, with a very apparent opacity on the cornea, may have resulted from interstitial keratitis. In this stage tertiary syphilitic outbreaks occasionally occur, resulting from the renewed activity of those germs which in some body part have lain quiescent since infancy. Such outbreaks are usually skin, or gland, or bone swellings, which slowly break down and suppurate. The diagnosis of syphilis should never be made by any one not a physician, first, because it entails a suspicion of the parent; second, because the disease requires a long course of treatment; third, because the evidence just set down may be simulated (in single particulars very closely) by rickets or tuberculosis, and more or less by other diseases. Rickets, for instance, may produce bone swelling and deformed teeth, malnutrition, and catarrh. Tuberculosis may produce similar glandular swellings and favor eczema resembling a syphilitic rash. *The physician only* is qualified to attempt the diagnosis of such a serious condition, and he is always glad to elicit corroborative evidence, such as previous miscarriages by the mother or a previous skin rash on either parent.

Why is the subject here emphasized? Because many children today may be found in the public schools bearing upon them the most suspicious markings. In the tenderloin districts of our large cities such children are actually plentiful. In

institutions for the feeble-minded the Wassermann reaction is positive in 20 per cent. of the inmates (see page 376). The salvation of these weakly, infected children depends largely upon the recognition of the syphilitic cause by the school inspector. A thorough knowledge of syphilis and gonorrhea, as well as of alcohol, tea, coffee, and tobacco already generally required (for the latter are innocent in comparison), should be gained by every teacher and high-school student. Then there will be some hope of preventing these diseases.

Tuberculosis.

Tuberculosis is a chronic, infectious, mildly contagious disease caused by the tubercle bacillus. Not only man, but also cattle and a considerable number of other animals, are subject to it.

Tuberculosis is the one infectious disease which today remains a plague upon mankind. In the United States its death rate is 167 per 100,000 population, or 1 death every two minutes and thirty-six seconds; it causes 11½ per cent. of all the deaths occurring each year; there are in Philadelphia (the writer's own city) 10,800 cases, with each year a mortality of 3600; there are in Pennsylvania 35,000 cases, with an annual mortality of 10,800; there are in the United States 500,000 cases, with an annual mortality of 160,000.

Some figures gathered at the International Tuberculosis Exposition are surprising:—

Deaths from tuberculosis in United States *every year*	160,000
Deaths from yellow fever in United States *in 115 years*	100,000
Deaths from tuberculosis in United States (1861-1865)	200,000
Deaths from injuries in Civil War (1861-1865)	205,000
Death rate for twelve years (1897-1909) in the United States from tuberculosis	23 per 1000
Death rate for twelve years (1897-1909) in India from bubonic plague	19 per 1000

Annual deaths from tuberculosis, Austria, 350 per 100,000 population.
Annual deaths from tuberculosis, Servia, 275 per 100,000 population.
Annual deaths from tuberculosis, Ireland, 215 per 100,000 population.
Annual deaths from tuberculosis, Norway, 276 per 100,000 population.
Annual deaths from tuberculosis, Germany, 185 per 100,000 population.
Annual deaths from tuberculosis, U. S., 167 per 100,000 population.
Annual deaths from tuberculosis, England, 121 per 100,000 population.

The causes of tuberculosis are the entrance of the germ into the system and unhygienic habits and environment.

The entrance of the germs into the system may be in food (particularly milk) or in the air breathed (the other modes of infection are less frequent and may here be disregarded).

Unhygienic habits and conditions which favor the growth of the tubercle bacillus in the body are poor food, bad air, loss of sleep and rest, lack of muscular exercise, and intemperate habits, either of dissipation or overwork.

Good nutrition is the greatest obstacle to the attack of tuberculosis. The person with good blood, a good chest capacity, and clear nasal breathing, which insures good air supply to the lungs, has little to fear.

A close examination of the tubercle bacilli found in tuberculous children has shown that in a majority of cases these bacilli are of the *bovine* variety—the variety that attacks cattle, whereas the bacilli found in tuberculous adults are usually the *human* variety. This accords with the fact that children are the greatest milk drinkers, and that in children the tuberculosis is intestinal rather than in the lungs.

The tuberculin vaccination reaction applied to children has shown that a considerable proportion of them are infected with tuberculosis. In many cases the disease is not active and evident, but latent, possibly stationary, or even gradually disappearing. Some of these cases in after years, when the individual is exposed to the bad air of the workshop or office, go on into active consumption. It is not probable, however, that most cases of adult tuberculosis begin so early. The initiation of the young man or woman to the ill-ventilated factory, or office, or store, to long hours of work, and to social habits (good or bad morally) entailing loss of sleep marks the beginning of the great danger.

The evidence of tuberculosis may be considered separately in the case of lung, bone, joint, and gland infection. All parts of the body, however, when infected, show the characteristic of a slow infection with gradually increasing fever and gradual loss of flesh and strength.

Lung tuberculosis is ordinarily termed *consumption.* The beginning stage is marked by very slight fever and a slightly

increased pulse rate. These two signs alone raise a suspicion of tuberculosis if no other cause for them can be found. Pain is often absent. After a while cough begins, and as the affected area in the lung softens and disintegrates mixed mucus and pus is expectorated. With gradually increasing weakness comes

Fig. 191.—Tuberculosis of spine. (See also orthopedic defects, Figs. 176 and 177.)

loss of appetite and copious sweating at night, the average case terminating fatally in about three years unless vigorous treatment is instituted.

Lung tuberculosis in the fourth decade of life is the most frequent cause of all the deaths occurring in the community.

Bone tuberculosis is usually seen in children and affects the spine or the ends of the thigh or shin bones near the joints. It is a slow infection marked by pain and some fever and by a

natural disinclination to use the affected part. The child limps or supports the weight of his body with his hands as the case may be. As the infected bone gradually softens and breaks down, a chronic abscess is formed, from which pus is discharged for long periods—months or years.

The treatment is surgical. In the early stage an arrest of the disease may be accomplished by rest and quiet of the part

Fig. 192.—Tuberculous school children. The little boy has a large tuberculous gland in the armpit. The others are attending the Phipps Institute for treatment for lung tuberculosis. The two small girls are sisters.

and the best hygienic conditions. Plaster casts, braces, and country or seashore air figure largely. In the later stage removal of the diseased and dead bone is the aim of the surgeon.

The child with advanced tuberculous spine disease displays a "hunchback." Its sharp, projecting point, contrasted with the rounded curve of the stoop-shouldered child, has already been described (page 475).

Joint tuberculosis usually affects the hip or knee—both large joints with a poor circulation, but compelled to withstand

heavy jars and weight. As in the case of bone tuberculosis (the two are usually coexistent), pain and a slow-forming abscess with chronic discharge are the principal evidence. Rather peculiarly, an inflammation of the hip-joint may produce a reflex pain in the region of the knee, and many a case of beginning hip disease has been overlooked (until too late) because the doctor examined the knee and not the hip. Similarly, beginning knee tuberculosis may give vague pains down the leg and a disastrous diagnosis of "rheumatism" may thereby be made. It should be remembered that, no matter where neuralgic pains may be, there is tenderness on pressure or jarring at the actual site of trouble, whether it be in hip or knee disease or in a case of suspected appendicitis.

Gland tuberculosis is another childhood affection and usually in the cervical glands from tubercle-infected teeth or tonsils, or else in the glands along the intestine because of infected food. The latter is a serious affection and need not here be considered. The tuberculous cervical gland has already been discussed (page 287).

Hookworm Disease.

This is an infection of the intestines by the hookworm, with consequent anemia and debility.

The hookworm was brought to the United States from Africa by negroes. It is found in the southeastern States,—from the Potomac to the Gulf, and from the Atlantic to western Texas, wherever a combination of warm climate, sandy soil, and insanitary sewage disposal are found. Allied varieties are found in other regions, such as England, the Alps, and California, where in mines it produces "miners' anemia."

Hookworm disease affects the white race much more seriously than the negro. Possibly the latter has acquired partial immunity through long-time infection in Africa.

The discovery of the hookworm has furnished the explanation of the pale-faced, listless, "poor whites" in the wooded regions of the Carolinas, Georgia, Florida, Mississippi, Alabama, and Texas and the wretched physical condition of the native whites of Porto Rico.

Fig. 193.—Hookworm disease—every person infected. Country schools in Mississippi. (Courtesy of Dr. Harold B. Wood, Jackson, Miss.)

The prevalence of the hookworm is amazing. In whole communities 50 per cent. of the adult population and 70 per cent. of the juvenile population have been found infected. Thirteen hundred children examined in Florida schools showed the disease in 60 per cent. of their number. In an investigation in the North Carolina cotton mills, 73 per cent. of the children workers and 43 per cent. of the women operators proved to be infected. The accompanying illustrations furnished by Dr. Wood show corresponding conditions in Mississippi.

The adult worm is about half an inch in length and exists only in the human. Its eggs are deposited in the soil with the feces, and there develop in the course of three or four days into larvæ. The larvæ exist as such for some time, awaiting the possible chance event which brings them to the human. Infection of the individual takes place either directly by way of the mouth (food, drink, or hands contaminated by polluted soil) or indirectly by wounds of the bare feet ("dew itch"—"ground itch"). In the latter case the larva must travel through the circulation roundabout to the intestines. This point reached, the larva develops into the adult worm, and, the female laying her eggs, the life cycle is repeated.

The anemia produced is variable. In mild cases the patient may be apparently well and unaware of infection or only slightly anemic. (These cases really form the majority, since investigation has shown that hookworm disease exists in 50 per cent. of the adult population and 70 per cent. of the child population in the country districts of southeastern States.) In severe cases the disease is practically a pernicious anemia, poisons generated in the intestines destroying the blood and degenerating the heart, lungs, kidneys, and other organs.

The school child infected with hookworm if the case be of moderate severity is pale, thin, and disinclined to work. Mental work is difficult of accomplishment. In the severe cases the pallor is extreme, the child thin, with a pot belly from indigestion and the eating of dirt (a peculiar form of perverted appetite seen in many cases of anemia). The mentality is so low that many cases appear not only very dull, but actually feebleminded.

The cure of hookworm, thanks to medical research, has proved extremely easy. Three or four doses of thymol (always taken under medical supervision) kill the worm and eggs. Unfortunately, some long-standing cases have become so anemic and debilitated that chronic invalidism remains. Still more unfortunately, so long as primitive sewage disposal methods continue and the soil is continually infected with millions of eggs from careless, ignorant persons, reinfection will occur in barefoot children and in the uncleanly.

THE PREVENTION OF INFECTIOUS DISEASE.

With the exception of small-pox, which has been marvelously conquered by the practice of vaccination, we are still more or less at the mercy of the infectious diseases which were familiar to our parents and grandparents. Fortunately, the present age is one of progression, and enough has already been discovered to insure the extinction of yellow fever and malaria by the draining of swamps and extermination of mosquitoes, a great reduction of typhoid fever by modern sewage disposal and preventive vaccination, of tuberculosis by improved hygienic conditions and disinfection of infected clothing and houses, and of hookworm by the now-known, easy cure by thymol medication. There is plenty of scientific knowledge at hand to justify the compulsory good care of children's throats, noses, and teeth by their parents, thereby reducing the number of diphtheria, tonsillitis, and tuberculosis cases; the enforcement of good ventilation in schools, trains, street cars, and public halls, thereby reducing the number of tuberculosis, pneumonia, and influenza cases, and the registration of cases of venereal disease, thereby saving thousands of innocent persons from stigmatizing disease. Against measles, German measles, mumps, whooping-cough, chicken-pox, and scarlet fever no preventive measures other than the time-honored ones of avoidance, isolation of the patient, and final disinfection have so far been discovered.

Reviewing the chief preventive measures against disease, the following may well be mentioned:—

1. *Maintenance of good general health.* This certainly causes a greater resistance to tuberculosis, ordinary pus-germ

infections, and hookworm disease, and possibly to the acute diseases of childhood, although it must be confessed that the latter attack without much distinction.

2. *Observance of hygienic habits.* By avoidance of constipation and social or sexual excesses, by proper sleep, exercise, food, and fresh air, no weak spots in the body defense are created.

3. *Healthy nose, throat, and teeth* are, as we have repeatedly seen, a great safeguard against sore throats, diphtheria, and cervical adenitis. The latter, when tuberculous in character, may, in turn, give rise to lung tuberculosis.

4. *Personal cleanliness* means the avoidance of germs—which is a much more simple and sensible procedure than personal uncleanliness with the necessity of their destruction. Just as surgeons in these days depend more upon plenty of soap and water than upon any other agent in preparing for an operation, so the child with clean hands, clean teeth, a clean nose, and clean clothes is the best protected of all.

5. *Good sanitary conditions* signify a number of things, principally abundance of good fresh air, cleanliness, pure food, and proper sewage disposal. Too much cannot be said as to the baneful influence of bad air. It is not the cold winter air that produces colds, pneumonia, and influenza, but the foul, hot room laden with germs in which the individual has previously been sitting. The Esquimaux in Iceland, the ranchman on the plains, and the children in fresh-air classes do not contract the diseases just mentioned. It is our ill-ventilated schools, factories, churches, clubs, trains, halls, and stuffy houses that present us with disease. The modern treatment of pneumonia and tuberculosis is primarily absolute fresh air, and pneumonia patients are often placed upon the roof of the hospital. As to cleanliness, in addition to the personal precautions just advocated, it is the duty of those in charge of the public institutions just mentioned to remove dust and provide sufficient sunlight. These public gathering places providing towels and drinking cups should provide individual paper towels and cups, or dispense with them. The spittoon, emblematic of tobacco and the catarrh resulting mostly from poor ventilation, should, if it exists, be regularly cleansed and washed with an antiseptic solution. Proper sewage disposal means the prevention of, at least, typhoid

fever and hookworm, and because sewer gas irritates the throat and depresses the system its absence means fewer sore-throat diseases.

6. *A high standard of morality* would mean the extinction of syphilis and gonorrhea.

7. *Artificially acquired immunity to disease* is possible in the case of at least five diseases. Vaccination for small-pox and for typhoid fever, antitoxin for diphtheria and for tetanus, and toxin injections for hydrophobia are well-established preventive measures.

Many of the above measures must depend upon the municipal or State government for their general enforcement. Already our health authorities supervise the water supply, the milk supply, the isolation of cases of contagious disease, the disinfection of infected houses, the ventilation and cleanliness of street cars, railway trains, public meeting halls, factories, and schools. Laws have been passed in several States abolishing the common drinking cup, and other laws are advocated providing for the registration of cases of venereal disease and certificates of decent health attached to the marriage license. In city schools, at least, cultures from the throats of healthy children are taken in order to block threatened epidemics of diphtheria.

In this connection a final word may be said concerning the compulsory disinfection of houses which have harbored consumptives. We know now that the old "hereditary case" of consumption was contracted not from the father or mother, but from the germs lingering for years around the sick-room, and from those picked up in nursing the case or using the same household articles. One of the urgently needed laws is that one which provides for the fining and imprisonment of that house owner or agent who knowingly rents a house previously occupied by a consumptive which has not been properly disinfected by the health authorities.

PREVALENCE OF DEFECTS AND DISEASES.

The principal defects of school children are those of the eyes, the nose and throat, the ear, the teeth, the nervous system, the skeleton, the skin, and the mentality. Under each of these headings may be found subdivisions which are important to a specialist, but from the standpoint of the teacher may be ignored. In the following paragraphs an endeavor has been made to present both in round numbers and in detail this information.

The average figures may be used for quick reference and general purposes:—

	Per cent.
EYE-STRAIN (sufficient to warrant glasses)	28
ENLARGED TONSILS (varying directly with poverty and indirectly with age)	6 to 12
NASAL OBSTRUCTION (usually adenoid, varying directly with poverty and indirectly with age)	12 to 24
DEFECTIVE HEARING (varying directly with poverty and indirectly with age)	2 to 5
DECAYED TEETH, primary grades (decreasing with age until 10 years)	50 to 75
DECAYED TEETH, grammar grades (increasing with age)	10 to 30
NERVOUS DISORDERS	5 to 20
ORTHOPEDIC DEFECTS:—	
Noticeable stoop shoulders (increasing with age and more prevalent among girls)	0 to 20
Spinal curvature (increasing with age and more prevalent among girls):—	
Noticeable	3
Actually existing in some degree	23
SKIN DISEASES:—	
Eczema (varying directly with poverty, malnutrition, and dirt, and inversely with age)	1 to 15
Pediculosis (depending upon race and social condition, almost entirely in white girls)	0 to 67

Eight charts are here presented which will give the reader accurate knowledge of the physical condition of children of

school age. The first three are based on examinations made by myself, and these have been kept separate because differences in social station and race exist in the different groups of children. A fourth study gives the New York report covering the same field; the fifth is a suggestive study of girls of high-school age reproduced because the writer has personal knowledge of Dr. Richards's ability as a physician, and the sixth is a study made under circumstances somewhat different from those of school inspection. It is the summary of the findings of the examining physician of a seashore sanatorium handling thousands of poor children. Reports by other writers are noted here and there in the following paragraphs of this chapter.

The seventh chart shows the physical condition of four classes of dull children. The eighth chart is a comparative table of the physical condition of (*a*) ordinary school children, (*b*) delinquent children, and (*c*) feeble-minded children.

Variability in the Prevalence of Defects.—It goes without saying that the conditions actually found often differ widely from those pictured by statistical figures. The examiner will find this variation from the average both in the number of defective children and in the number of defects per child. Exemplifying the first in the Todd School of Philadelphia, 15 second-grade boys were examined, with the result that 6 were found to possess defective vision, 5 having vision of less than $\frac{3}{4}$:—

N——— F———, vision $\frac{2}{3}$.
J——— F———, vision $\frac{5}{6}$.
M——— G———, vision $\frac{1}{2}$.
J——— B———, vision $\frac{2}{3}$, suppurating ears, adenoids, 10 decayed teeth.
E——— O'H———, vision $\frac{3}{4}$.
E——— S———, vision $\frac{1}{4}$, 3 decayed teeth.
C——— S———, 4 decayed teeth.
W——— McN———, enlarged tonsils, 5 decayed teeth.

In examining the teeth of young children, in whom a large proportion are always defective, it is not uncommon to find 10 consecutive children showing this defect.

In regard to the number of defects per child, the school physician, when examining children of the better classes, will fre-

quently pass 5 to 10 consecutive children as "normal," that is, normal enough that a parent's notice is not warranted. On the other hand, it is not uncommon to notify a parent of the existence of three defects to be corrected, and occasionally four or five defects are found.

Here is presented a list of children with multiple physical defects taken here and there from the records of the writer without special search:—

Camac School, Philadelphia:—

Ida W——, eye-strain, adenoids, deafness, round shoulders, enlarged tonsils.
Minnie S——, enlarged tonsils, adenoids, round shoulders.
Albert N——, adenoids, deafness.
Ralph S——, adenoids, defective speech.
Nellie R——, eye-strain, enlarged tonsils, deafness.
Carrie H——, cervical adenitis, adenoids, deafness, decayed teeth.

It is interesting to note that in every one of the cases of the Camac School the record cases showed no treatment.

Rutledge School, Philadelphia:—

Martin A——, eye-strain (R. 1/5, L. 1/3), enlarged tonsils. adenoids.
Adele B——, eye-strain, styes, poor nutrition, nervous.
Lyle C——, eye-strain, adenoids, defective hearing, stoop shoulders.

The number of defects per child found by the inspector varies with the age, race, social condition, and mental capacity. In this connection let it be noted that eye-strain, nervous disorders, and spinal deformities increase with age, while nose, throat, and ear defects decrease in severity (*i.e.*, become less evident) after the age of 10. Decayed teeth are most noticeable from 6 to 9 years. Regarding the social factor, nose, throat, and ear defects (adenoids) are much more common among the poor, as are also poor nutrition, skin disorders, and the sore-throat diseases. Regarding the influence of race, the Jews are particularly nervous and the colored people are exempt from pediculosis on account of the character of the hair.

An idea of the number of defects per pupil among different classes of children may be obtained from the foregoing records.

Fig. 194.—Chart showing numerous physically defective and dull children. (Poor Americans, Philadelphia.) The letters *V*, *S*, *M*, and *B* signify defective vision, squint, miscellaneous defects, and backward mentality.

General Chart 1.

Prevalence of Physical Defects in School Children, with the Variations Due to Social and Racial Conditions.

	Allison and Clag-horn Schools. (Medium to affluent children.)		Kane and Morris Schools. (White, Am., poor to medium.)		Mt. Vernon, Burk, and other Schools. (Poor Russian-Jewish and Italian; mostly primary.)	
Number children examined	558		1034		847	
		Per cent.		Per cent.		Per cent.
Eye-strain — without glasses	124	*22*	312	*30*	220	*25*
With glasses	62	*11*	71	*8*	35	*4*
Enlarged tonsils	34	*6*	63	*6*	78	*9*
Nasal obstruction	22	*4*	18	*2*	91	*11*
Defective hearing	12	*2*	25	*2*	17	*2*
Poor nutrition and anemia	13	*2*	69	*7*	35	*4*
Orthopedic defects	34	*6*	57	*6*	31	*3.5*
Defective speech	0	*0*	7	*0.7*	2	*0.2*
Nervous (including chorea)	9	*1.5*	4	*0.4*	4	*0 4*
Eczema and other skin diseases	1	*0.2*	14	*1*	21	*2*
Miscellaneous	7	*1*	16	*1*	36	*4*
Decayed teeth	(Not given, owing to imperfect records.)					

General Chart 2.

Prevalence of Physical Defects in 847 Philadelphia School Children, Showing Variations by Grade (approximately by age).

(These children comprise the group in the right-hand column of Chart 1.)

GRADE	Total Number Children	NORMAL CHILDREN		DEFECTIVE CHILDREN					Defective Vision: Visual Acuity { Without headaches / With headaches (h) / Wearing Glasses (g)						Other Defects					Defective teeth						
		Number	Percent	Defective Teeth	Other Defects	Both	Whole Number	Percent	N	5/6	3/4	2/3	1/2	1/3 or less	Ear Defects	Tonsils Only	Both	Nasal Obstruction Only	Miscellaneous	1 missing	2 "	3 "	4 "	5 "	6 "	7 or more
7 & 8	200	85	42½%	25	61	29	115	57½%	4^h 2^g	13 2^h 4^g 3^{gh}	8 1^g	3 1^h 2^g	2 1^h 2^g	7 5^h 2^g		12	5	11	28*	24	12	6	3	1		
5 & 6	188	70	37%	28	69	21	118	63%	5^h 2^g	4 4^h 2^g 2^{gh}	15 1^h 2^g	9 2^h	7 2^h 2^g	6 2^h	3	6	11	7	27†	24	15	9	1	1		
4	154	54	35%	16	50	34	100	65%	2^h 3^g	5 9^h 2^g	9 7^h 2^g	5 1^h	9 3^h 2^g	5	6	13	7	14	19‡	16	21	9	8	4		
2 & 3	305	109	36%	74	83	39	196	64%	2^h 1^g	3 7^h 1^g	12 5^h 2^g	5 3^h	3 6^h 1^g	9 2^h	8	12	12	24	56§	29	22	25	19	11	4	28
			38%					62%																		

(Continued on next page.)

List of Miscellaneous Defects Noted in Chart 2.

	* 8th and 7th	† 6th and 5th	‡ 4th	§ 3d and 2d
Anemia	2	0	1	1
Poor nutrition	6	9	4	12
Rickets	0	0	0	1
Stoop shoulders	11	5	3	7
Bow legs	0	0	0	1
Hemiplegia	0	0	0	1
Eczema	1	3	2	12
Alopecia areata	0	0	1	0
Dirty	0	0	1	0
Ichthyosis	0	0	0	1
Nervous	1	0	1	1
Chorea	0	0	0	1
Migraine	1	0	0	0
Infantile paralysis	0	1	1	1
Bites nails	0	0	1	0
Angioneurotic edema	0	1	0	0
Nasal catarrh	1	2	2	7
Trachoma	0	0	1	1
Conjunctivitis	0	0	0	1
Phlyc. conjunctivitis	0	0	1	0
Congenital cataract	0	1	0	0
Heart disease	3	0	2	2
Cervical adenitis	0	1	0	1
Tuberculosis (lungs)	1	0	0	2
Tubercular bone sinus	0	1	0	0
Indigestion	1	0	0	0
Defective speech	1	1	0	0

General Chart 3.

Physical Condition of the School Children of the School of Observation, University of Pennsylvania.[1]
(Model Chart.)

The Department of Pedagogy of the University of Pennsylvania conducted during the summer of 1909 a school of observation for teachers, comprising 7 graded classes, containing 156 pupils. These children attended the school usually for the purpose of qualifying for the grade higher than that occupied in June at the closing of the public school. Some of them had failed of promotion on account of absence due to sickness; others had failed apparently from inability to do the regular work in

[1] The Psychological Clinic, vol. iii, pp. 134-5 and pp. 161-3.

the prescribed time. Others were precocious children desirous of advancing an extra grade during the summer season. As a whole they presented an appearance equal to and possibly slightly above the average school child.

The physical condition of these children, when the results of the examination were summarized, proved to be about the same as that of public school children generally, except that the cases of poor nutrition and skin disease found so frequently associated with poverty and squalor were absent. The percentage of children showing physical defects and receiving parents' notices was 62.2 per cent. of the whole number. Of these, however, 25.7 per cent. received notices for decayed teeth only, so that the percentage of defectives, disregarding decayed teeth, was 36.5.

The following table shows the number of normal and physically defective children in each grade, the total number of defects found, and gives a thoroughly intelligible idea of the number of defects found in each grade after the subtraction of the large number of cases of decayed teeth, which comprise 60 of the 145 defects found:—

Grade.	Total number of children.	Normal children.	DEFECTIVE CHILDREN.				Total number of defects.
			NUMBER OF CHILDREN POSSESSING				
			Physical defects other than decayed teeth.	Decayed teeth and other defects.	Decayed teeth only.	Total.	
8	32	14	10	3	5	18	32
7	29	18	4	1	6	11	13
6	29	12	7	4	6	17	24
5	22	5	5	2	10	17	25
4	21	3	7	6	5	18	30
3	13	3	3	3	4	10	14
2	10	4	1	1	4	6	7
Total	156	59	37	20	40	97	145
Percentage		37.8	23.7	12.8	25.7	*62.2*	

$$\underbrace{\underbrace{23.7 \quad 12.8}_{36.5} \quad 25.7}_{38.5}$$

The principal defects found were eye-strain, enlarged tonsils, nasal obstruction, defective hearing, poor nutrition, and decayed teeth. They are given in the following table:—

Total number of children examined	156
Children receiving parents' notices for physical defects	97
Children regarded as physically normal	59

Defects	Number of cases	Percentage of all children
Eye-strain	32	20.5
Enlarged tonsils	8	5.1
Nasal obstruction	21	13.5
Defective hearing (marked 3)	8	5.1
Poor nutrition	7	4.5
Decayed teeth	60	38.5
Nervous exhaustion	3	2.
Stoop shoulders	3	2.
Spinal curvature	1	
Weak heart	1	
Infantile spinal paralysis	1	

The eye-strain cases were subdivided as follows: Normal vision, with headache and eye-tire, 14; three-fourths vision, 12; two-thirds vision, 3; one-half vision, 3; one-third vision, 1. The number of children already wearing eye-glasses was 12. The total number of children with defective vision was thus 44, or 28 per cent.

The proportion of children with decayed teeth was 38.5 per cent., the proportion being much greater in the lower grades owing to the decay of the temporary teeth. This is shown in the following table:—

Grade	Percentage with decayed teeth
8	25.
7	24.
6	34.5
5	54.5
4	52.4
3	53.8
2	50.

General Chart 4.

Prevalence of Physical Defects, New York City School Children. Report of Dr. S. Josephine Baker, Director Bureau of Child Hygiene, Year ending December 31, 1910.

(Statistics arranged in the model form shown in Chart 3.)

		Per cent.
Number examined	266,426	
Number needing treatment	196,664, or	*74.8*
Number with defects other than decayed teeth	32,514, or	*12.2*
Number with decayed teeth and other defects	69,188, or	*25.9*
Number with decayed teeth only	95,062, or	*35.6*
Number with defective vision	29,634, or	*11.0*
Number with defective hearing	1,519, or	*.5*
Number with defective nasal breathing	40,946, or	*15.0*
Number with hypertrophied tonsils	50,012, or	*19.0*
Number with tuberculous lymph nodes	759, or	*.3*
Number with pulmonary disease	656, or	*.3*
Number with cardiac disease	2,370, or	*.9*
Number with chorea	951, or	*.4*
Number with orthopedic defect	1,683, or	*.6*
Number with malnutrition	8,691, or	*3.0*
Number with defective teeth	164,250, or	*61.0*
Number with defective palate	153, or	*.05*

General Chart 5.

Report of Examination of Freshman Class, William Penn High School for Girls, Philadelphia, by Dr. Florence Harvey Richards, Medical Director.

Average age, 14½ years; American-born parents, 236; one or both foreign-born (Russians predominating), 176; Afro-Americans, 25.

		Per cent.
Total number examined	462	
Defective vision (marked)	44	*9.5*
Wearing glasses	73	*11.0*
Enlarged tonsils	132	*28.0*
Defective hearing	27	*6.0*
Adenoids	37	*8.0*
Cardiac disease	13	*3.0*
Orthopedic defects	87	*19.0*
Nervous (including chorea, 3 cases)	81	*18.0*
Skin disease (acne on face)	97	*21.0*
Decayed teeth	46	*10.0*
Miscellaneous	14	*3.0*

General Chart 6.

Report of Examination of Children at Sea Breeze, L. I., Summer of 1906, by Dr. Linsly R. Williams, of New York.

(Reported in the Journal of the A. M. A., Nov. 16, 1907.)

Ages of girls, 5 to 15. Boys, 5 to 12.
Total number examined, 2000.

	Boys.		Girls.		Grand totals.		Total per cent. defect.
	No. exam.	No. defect.	No. exam.	No. defect.	No. exam.	No. defect.	
Teeth	555	412	788	562	1343	974	72
Hypertrophied tonsils	550	85	769	101	1346	186	13
Enlarged glands of neck.	555	......	801	......	1356		
Anterior	......	400	......	436	......	836	61
Posterior	......	299	......	324	......	623	46
Chorea	517	4	760	8	1277	12	9-10
Cardiac disease	519	30	765	79	1284	109	8
Pulmonary disease	521	13	763	20	1284	33	2
Skin diseases	513	6	755	9	1268	15	1
Deformities	276	73	797	92	1973	165	15
Defective vision	417	38	709	80	1120	118	10
Defective nasal breathing	540	36	780	34	1320	70	5
Adenoids	531	54	785	35	1316	89	6
Defective hearing	445	19	699	33	1144	52	4
Defective mentality	329	54	525	48	854	102	11
Poor nutrition	372	125	682	246	1954	371	35
Deformed palate	544	20	790	20	1334	40	2

General Chart 7.

Physical Condition of 174 Dull Children in the William McKinley Primary School, Philadelphia.

They were in four special classes and represented that 25 per cent. of the school population which stood lowest in school work, retardation in several instances being as much as three years ("Mentally Defective Children in the Public Schools," by Walter S. Cornell, M.D., *Psychological Clinic,* vol. ii, No. 3).

	I	II	III	IV	Total	Per cent.
Number of pupils	39	45	44	46	174	
Grade	4	3½	2½	1½		
Average age of class, in years	11½	11	10	8¾		
1. Number of children in whom no noteworthy physical defect was observed	4	9	10	10	33	*19*
2. Children with slight visual defect, or nasal obstruction, not sufficient to justify official recommendation for treatment	6	6	7	7	26	*15*
3. Children with noticeable defects which necessitated notices to parents	29	30	27	7	115	*66*
Poor vision	12	19	18	19	68	*39.4*
[1] Nasal obstruction (adenoid): majority with nasal catarrh and slight deafness	13	11	4	12	40	*23*
Hypertrophied tonsils	4	2	2	3	11	*6.5*
Marked deafness and discharging ears	1	3	2	1	7	*4*
Poor nutrition	4	5	8	5	22	*12.6*
Badly decayed teeth	1	5	2	5	13	*7.5*
Round shoulders and flat chest	6	2	4	2	14	*8*
Other defects	2	3	3	5	13	*7.5*
3a. Number of defects for which notices were issued	43	50	43	52	188	
2a. Number of slight defects for which notices were not issued	19	17	16	17	69	
Total number of defects, including both slight and serious	62	67	59	69	257	

[1] Including 23 cases of slight nasal obstruction.

General Chart 8.

Comparative Table Showing Physical Condition of (1) Public School Children in General; (2) Disciplinary Cases in Special Schools; (3) Disciplinary Cases Handled by the Children's Bureau; (4) Feeble-minded (High-grade) Children. All Philadelphia Children.

		1*		2*		3*		4*	
		Public school children in general. (Generally accepted figures used.)		Disciplinary cases—Special Schools No. 2 and No. 6.		Disciplinary cases—Children's Bureau investigated.		High-grade feeble-mind and borderline cases found in public schools.	
		Number children.	Per cent.	Number children.	Per cent.	Number children.	Per cent.	Number children.	Per cent.
	Physically normal	......	*38*	46	*39*	19	*27*	21	*12*
(*a*) Proportion of physically defective children to normal children.	Physically defective	......	*62*	73	*61*	51	*73*	161	*88*
	Decayed teeth only	......	*26*	14	*12*	?	?	15	*8*
	Defects other than decayed teeth	......	*24*	45	*38*	?	?	91	*50*
	Both decayed teeth and other defects	......	*13*	14	*12*	?	?	55	*30*
	Total	......	*100*	119	*100*	70	*100*	182	*100*

(b) Number of physical defects found.	Eye-strain		28	87	31	24	34	76	42
	Nasal obstruction		13	80	25	22	31	92	50
	Enlarged tonsils		5	14	12	3	4	17	9
	Defective hearing		5	4	3	1	1	13	7
	Poor nutrition		5	10	8	5	7	59	32
	Decayed teeth		38	28	24	23	22	69	38
	Miscellaneous			4	3	58	69	39	21
	Total defects			127		136		365	
(c) Proportion of physical defects to children.				$\frac{127}{116}$	107	$\frac{136}{70}$	194	$\frac{365}{182}$	200

[1] BOYS AND GIRLS.—The figures here given are based on the American school children attending the School of Observation of the University of Pennsylvania. It should be remembered, however, that the prevalence of nasal obstruction is 6 per cent. to 20 per cent., according to age and social condition, that likewise the prevalence of poor nutrition is 4 per cent. to 20 per cent., that likewise (owing to the prevalence of skin affections among the ignorant poor) the "miscellaneous" defects may exist in varying figures (5 per cent. to 15 per cent.).

[2] BOYS ONLY.—The 37 eye-strain cases analyzed showed that 10 had normal vision with sensations of fatigue and headache, 15 had headache with defective vision, and 12 had defective vision without headache or discomfort. The recorded visual acuity was 6/6, 10; 5/6, 5; 3/4, 14; 2/3, 5; 1/2, 2; 1/3, 1. Only 3 possessed eye-glasses, 4 suffered from internal strabismus, and 2 suffered from trachoma. The 4 miscellaneous cases were nervous exhaustion, 1; stoopshouldered, 1; infantile paralysis, 1; tubercular cervical adenitis, 1. The low percentage of cases of decayed teeth is due to the age factor. The disciplinary cases are boys mostly 10 and 11 years of age who have new permanent teeth.

[3] BOYS ONLY.—The percentage of decayed teeth is low. (See under 2, just preceding.) The 58 miscellaneous cases include enuresis 40 (! ! !), hernia 3, flat chest 2, chorea 3, scabies 3, ringworm 1, asthma 1, scleroderma 1, eczema 2, defective speech 2.

[4] BOYS AND GIRLS.—The 39 miscellaneous defects included 22 cases of nervous exhaustion.

The Prevalence of Eye Defects.

Eye-strain and trachoma are the principal eye defects in school work. For some knowledge of other eye defects not here considered, but occasionally met with, the reader is referred to that section of the chapter on Medical Inspection bearing on the work done by the medical inspector.

Charts 1, 2, 3, 4, 5, 6, 7, and 8, just preceding, will be referred to in this chapter simply by their numbers. The other authorities quoted are mentioned in the footnotes.

Under the head of eye-strain we wish particularly to know (*a*) the proportion of children needing eye-glasses, and the proportion of children already wearing them; (*b*) the proportion of eye-strain cases suffering from defective vision, from headache and fatigue, and from both; (*c*) the proportion of the different varieties of refractive error, particularly myopia, because, while myopia usually requires a specialist's diagnosis, it results from neglect of the eyes and furnishes a powerful argument for medical inspection.

(*a*) Proportion of Children Requiring Eye-glasses, and Proportion Already Provided with Glasses.

	Not wearing glasses.	Wearing glasses.	Total.
New York Health Report, 1906	....	....	20
Philadelphia Health Report	....	....	28.5
1 Vermont school children	....	....	27
2 Eleven hundred Philadelphia children	24.5	7.5	32
Eight hundred and forty-seven Philadelphia children (Chart 1)	25	4	29
3 Brookline, Mass., children	23		
4 Twenty thousand school children (by ophthalmologists), at least			26
5 High-school students (Phila. boys; 9 per cent. constantly; 8 per cent. occasionally)		17	
High-school students (Phila. girls; see Chart 5)		11	
6 College students (Univ. of Penna.)		34	
7 College students (Univ. of Penna. freshman class; 15 per cent. wore glasses constantly; this report included all doubtful cases and is therefore somewhat high)	19	28	47

An interesting report on the prevalence of eye-strain and trachoma in the Indians "fresh from the plains" is given by Dr. Jones, of the Institution at Hampden, Virginia (*Journal American Medical Association,* August 15, 1908). The report covers 289 cases. Contrary to the expected findings, which would show extraordinarily good vision, the percentage having refractive error necessitating the wearing of glasses is 34.6,—substantially the same as for whites. There were 30 myopia cases, or 10.3 per cent. of the whole number. Trachoma was found in 51 cases, which was 17.6 per cent. of the whole number. All these results are so remarkable that they should be verified before they are accepted as authoritative.

In an interesting article giving the results of the examination of 3092 white children and 1809 colored children, Dr. J. L. Minor[8] shows the better vision of the colored race. Dr. Minor's table shows that the proportion of badly seeing whites is 1 to 6, whereas the proportion among the blacks is only 1 to 15.

(*b*) Proportion of Eye-strain Cases Suffering from Defective Vision and from Headache or Fatigue.

1. *Defective vision* (estimated by ability to read Snellen type for distance) :—

London School Report, 1904. Here is given the first year's work of 8 ophthalmic surgeons specially appointed to examine the eyes of school children. The result of 20,000 examinations is recorded, demonstrating that about 7.3 per cent. of all children suffer from $^6/_{18}$ or worse defective vision. The percentages given are calculated from the number of children stated in the report.

Acuity of vision	6/6	6/9	6/12	6/18	6/24	6/30	6/60 or more
No. of children (all grades) ..	15339	2780	1098	858	315	166	188
Percentage	*74*	*13.4*	*5.3*	*4.1*	*1.5*	*.8*	*.9*

Philadelphia, examination of 1156 school children :—

	Total.	Total per cent.
Normal	759	*65.7*
Normal	568	
Normal minus, but no symptoms of eye-strain	119	
One eye normal; the other eye nearly so	72	
Defective	397	*34.3*
One eye normal and one eye with vision less than two-thirds	32	
Both eyes defective—equally defective	303	
Normal minus vision and showing symptoms of eye-strain	(51)	
Vision three-quarters and two-thirds	(185)	
Vision one-half or less	(67)	
Both eyes defective—unequally defective	62	
Vision in better eye two-thirds or more	(44)	
Vision in better eye less than two-thirds	(18)	
Total number of children	1156	*100*

IMPORTANT NOTE.—Illumination of test card by natural light only. Vision recorded with the aid of eye-glasses in all cases already wearing them. Squint cases (total 29) included in above summary. (W. S. Cornell, New York Medical Journal, June 1, 1907.)

2. *Prevalence of Headache in Eye-strain Cases.*—The existence of headache, local fatigue, and other symptoms (asthenopia) is exceedingly common in eye-strain, the latter furnishing a great majority of the cases of headache occurring in children. A study of about 200 cases of eye-strain by the writer[2] revealed asthenopia in two-thirds of the cases. A careful study of the subject, classic in its exactness, is given by S. D. Risley, in Norris and Oliver's "System of Diseases of the Eye." Taken for each variety of refractive error, it varies from 35 per cent. in simple hyperopia to 74 per cent. in mixed astigmatism.

Posey and McKenzie found 87 out of a total of 883 college students suffering from headache. Of this number 47 wore glasses and 49 did not. Of those complaining of headache, 7.59 per cent. had subnormal vision, while the remaining 92.41 per cent. had full visual acuity, and on this account did not suspect their eyes of being at fault.

The writer, in an examination of 847 Philadelphia school children in the year 1910 (see Chart 2), found 102, or 12 per

cent., who suffered from headache. Of these 99 wore no glasses, and the other 3 wore glasses not suited to them. Since in this case the total number of eye-strain cases was 246, it can be seen that 41.5 per cent. of them suffered from headache. A previous examination of 1156 school children[2] showed 31 per cent. of all cases of eye-strain to suffer from headache. Among the boys 17 per cent. of the eye-strain cases had headache. Among the girls in the higher grammar grades 67 per cent. of the eye-strain cases were affected.

(c) Varieties of Refractive Error and the Percentage of Each.

Details of the refractive conditions found in the eyes of school children are given in the reports of Risley and Minor,[8] of college students in the reports of Zimmerman[7] and Derby, and of Indians in the report of Jones (mentioned in section *a*). The fact that hyperopia, myopia, and astigmatism, by their combinations, furnish 7 varieties of refractive error makes complete studies of too special a nature for our purpose. The report of Dr. B. Alexander Randall on the medical students of the University of Pennsylvania shows 87.8 per cent. to have "imperfect" eyes. Of this number, many of whom were cases of simple hyperopia not requiring eye-glasses, 61 per cent. (of all students examined) showed simple hyperopia, 12.2 per cent. hyperopic astigmatism, 6.6 per cent. simple myopia, 4.4 per cent. myopic astigmatism, and 3.3 per cent. mixed astigmatism. From these figures the total number of astigmatism cases (19.9 per cent. of all examined) may be calculated.

The findings of Risley[11] in 2500 school children may also be quoted:—

		Per cent.
Emmetropia		*11.19*
Hyperopia (simple, 31.23 per cent.)	}	*74.04*
(With astigmatism, 42.81 per cent.)	}	
Myopia (simple, 2.68 per cent.)	}	*13.70*
(With astigmatism, 11.02 per cent.)	}	
Mixed astigmatism		*1.07*

(S. D. Risley, in "System of Diseases of the Eye." Norris and Oliver, vol. ii, page 353.)

Myopia is a defect of such significance that its prevalence should be particularly noted. It has been shown to be due to

the lengthening of an originally hyperopic eyeball through degeneration and stretching of its coats. Although it has been shown to occur numerously in certain families, and, therefore, is, at least, an effect of hereditary predisposition, it is principally *an indication of neglect to procure glasses in early life.* The table given below shows the increasing presence of myopia in the higher grades. Among the illiterate working class and those whose ancestors have been of this class (German peasants, the colored race, *et cetera*) myopia is practically unknown. The report of Jones (see section *a*) stating that myopia in considerable degree is found among the Indians shows an exception to this rule.

Table Showing the Progressive Increase of Myopia through the Higher Grades.

	German city schools (Cohn, of Breslau)	Philadelphia schools (Risley)[10]		Philadelphia schools (Wessels)[9]	Boston school (Loring)[8]	University of Pennsylvania (Posey and McKenzie)[6]
	Per ct.	Years.		Per cent.	Per cent.	Per cent.
Elementary schools.	6.7	8½	4.27	3.35 6-14 years	3 (Not including 3⅓ per cent. mixed astigmatism.)	14.7 (12.75 per ct. in lower classes: 19.75 per ct. in upper classes.)
Higher girls' schools	7.7	11½	8.75			
Intermediate schools	10.3	14½	11.50			
Academy grade .... (Real Schulen)	19.7	17½	19.33			
Gymnasium........	26.2					
University.........	59.5					

Since myopia is a secondary condition, occurring in certain neglected cases, it naturally follows that a decrease in the number of myopia cases should occur, as the medical profession and the public have come to realize the value of the early correction of optical error.

Such has actually been the case and is an encouraging sign, even though the general class of congenitally defective eyes is probably as numerous as ever. We are indebted for this demonstration to S. D. Risley and his assistants, who reviewed 195,000 prescriptions for glasses, written over the period extending from

1874 to 1893. There was found to be a steady and progressive decline in the number of those prescriptions written for the correction of myopia.

Quoting briefly without fractional exactness (for tables and charts see Norris and Oliver, vol. ii, pp. 376-377), in the year 1877, 27 per cent. of all prescriptions were for myopia, 20 per cent. in 1885, and 16 per cent. in 1893.

Trachoma.

Trachoma is extremely prevalent among the lower classes of southeastern Europe, particularly in Turkey, Italy, and southern Russia. It is said that in Turkey such public schools as exist are shunned by the better classes on this account. At the port of Naples, in 1909, 20,000 prospective emigrants were turned back by the authorities because of the United States' prohibition of entry in trachoma cases. In New York City, in the year 1910, out of 19,545 immigrants, 1442 were deported because of trachoma.

The health reports of New York City dealing with the diseases of school children have consistently shown 8000 to 10,000 cases of trachoma each year since 1905. There is some doubt, however, acknowledged by the authorities themselves, as to the diagnosis in most of the cases; so it is almost certain that many of these cases are "suspects" and really follicular conjunctivitis. The maintenance of 3 trachoma dispensaries by the city, because the eye dispensaries of the general hospitals were overrun with cases sent in by school inspectors, is proof, however, that the disease does exist to a surprising extent.

In Philadelphia, the writer, in 1909, examined 3000 poor Italian children for the existence of trachoma and found 12 undoubted cases and 20 doubtful ones. A special commission appointed by the Philadelphia authorities to investigate the subject in 1910 discovered 41 cases in 6000 children examined. The conclusion in Philadelphia was that, in view of the relatively few cases and the low degree of contagion, the regular hospitals were capable of handling them.

In reformatories, prisons, and other institutions containing large numbers of the lower classes trachoma is not uncommon. Thus, an examination in the reformatory for boys at Glen

Mills, Pa., showed 12 cases among 700 boys. The boys in this institution are mostly from Philadelphia, and the cases were probably Italians or Russian Jews.

Bibliography on the Eyes.

[1] Proceedings Sixth Annual Conference of the Sanitary Officers of the State of New York, pages 164-174.

[2] "Eye-strain in School Children," W. S. Cornell, M.D., New York Medical Journal, June 1, 1907.

[3] "Examination of the Eyes of 420 School Children in the Town of Brookline," R. G. Loring, M.D., Boston Medical and Surgical Journal, December 13, 1906.

[4] "Report of Public Health Commission of the London County Council, 1904," P. S. King & Son, Publishers; Sir Shirley Murphy, Health Officer; Dr. James Kerr, in charge of school inspection.

[5] "Eight hundred and fifty boys," Northeast Manual Training High School, Philadelphia (courtesy Prof. V. B. Brecht).

[6] "Results of the Examination of Students' Eyes, University of Pennsylvania," by William Campbell Posey, M.D., and R. Tait McKenzie, M.D., Journal American Medical Association, March 23, 1907.

[7] "A Report upon the Eyes of Four Classes of College Freshmen at the University of Pennsylvania," M. W. Zimmerman, M.D., Annals of Ophthalmology, October, 1907. This paper refers also to the work of Dr. Haskett Derby, at Amherst and Harvard, in 1888, which is not here at hand.

[8] "Examination of the Eyes of the Pupils of the Public Schools of Memphis, Tennessee" (comparison of the whites and blacks), J. L. Minor, M.D. A report on the eyes of negroes was published several years ago by Dr. P. A. Callan, of New York City.

[9] Report of Dr. L. C. Wessels, Ophthalmologist, Philadelphia Health Report.

[10] "Examination of the Eyes of 2500 School Children, Philadelphia." This is one of the most thorough studies made. Transactions of the Pennsylvania Medical Society, 1881. Philadelphia Medical Times, July 30, 1881. Norris and Oliver, "Diseases of the Eye," vol. ii, pages 376-377.

[11] *Ibid.*, page 353.

Prevalence of Nose and Throat Defects and Defective Hearing.

Here the ear is considered with the nose and throat because ear troubles are practically all dependent upon previous diseases of the nose and throat. Under nose and throat are included enlarged tonsils (adenoid), nasal obstruction, and nasal catarrh.

Although it is the purpose of this chapter to deal with ordinary school children rather than with those belonging to special groups, the conditions found in the nose, throat, and ear vary so widely with age and social condition that lump figures are misleading. Before reading the information given below, the reader should firmly fix in mind the fact that enlarged tonsils, adenoids, and their co-existing catarrhal deafness tend to decrease at about the ninth or tenth year. For this reason a small child may be reported as defective and four or five years subsequently may be passed as normal. The difference between the children of the poor and the children of the well-to-do is also startling. Probably from the local irritation of ill-ventilated rooms, and partly from the flabby tissues resulting from poor food, the children of the slums suffer from nose and throat defects in at least twice the proportion of the children of the better classes.

As a general rule, based on the writer's experience, with a review of about 6000 children, the following table may be followed:—

Table Showing Prevalence of Nasal Obstruction.

	Children of the well-to-do.	Children of the poor.
	Per cent.	Per cent.
Young children	*12*	*25*
Children over 10 years	*6*	*12*

The prevalence of enlarged tonsils may be taken at half these figures.

The relative frequency with which adenoids cause obstruction of the nasal passages, are associated with enlargement of the tonsils, and cause ear complications is better ascertained from the case reports of a specialist than from the findings of the school physician. Dr. Arslan (*Journal of Laryngology,* 1895) gives an analysis of 426 cases of adenoids. He found 294 (or 69 per cent.) caused obstruction; 158 (or 37 per cent.)

caused chronic inflammatory enlargement of the tonsils and pharyngitis; conversely, adenoids were present in about three-fourths of all cases of enlarged tonsils; 252 (or 59 per cent.) showed middle-ear catarrh and possibly more serious consequences.

An accurate investigation of the hearing of school children was made by Mr. J. M. McCallie and the writer, at the Summer School of the University of Pennsylvania, sessions of 1910 and 1911. The McCallie audiometer, described on page 300, was used and each ear tested separately.

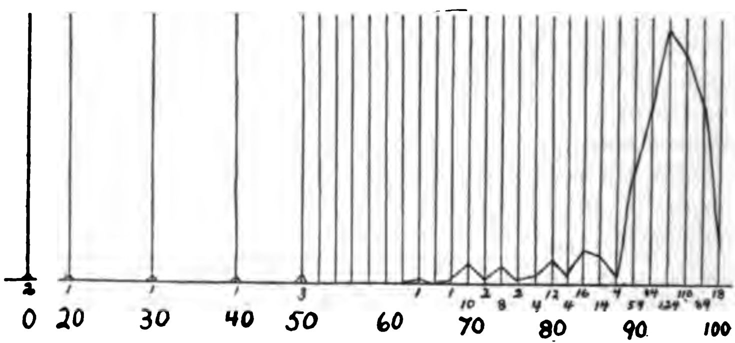


Fig. 195.—The hearing of school children as shown by McCallie's audiometer (record of 560 ears tested). The large numbers 0 to 100 constitute a scale representing the acuity of hearing.

Summary of the results showed that of the 560 ears examined 474, or 84 per cent., tested 90 or above on the instrument, 76, or 14 per cent., tested between 70 and 90, and 10, or 2 per cent., tested below 70. A plurality of the ears tested showed a hearing of 94 to 95 (see chart), and most of the others tested so close to this that normal hearing, as indicated by this instrument, was evidently anywhere from 90 to 98.

This signifies, therefore, that 14 per cent. of all ears are slightly deaf, and 2 per cent. of all ears are quite deaf. The proportion of *children* is approximately the same as these proportions of *ears*—a little higher because some children have one ear only defective.

Table Showing Prevalence of Nose, Throat, and Ear Defects.

	Hypertrophied tonsils.			Nasal obstruction.			Defective hearing.				
	Number examined.	Found defective.	Per cent. found defective.	Number examined.	Found defective.	Per cent. found defective.	Number examined.	Slightly deaf.	Marked deafness.	Total number defective.	Per cent. found defective.
Philadelphia school children (see Chart 1)	2439	175	*7.2*	2439	131	*5.4*	2439	....	....	54	*2*
Children in Summer School, University of Pennsylvania, 1909 (see Chart 3)	156	8	*5.1*	156	21	*13.5*	156	5	3	8	*5.1*
[12]Same, 1911.											
New York school children, 1910 (see Chart 4)	266426	50012	*19*	266426	40946	*15*	266426	....	....	1519	*5*
[13]New York school children, 1906	79065	3411	*4.3*	79065	8974	*11.3*	79065	....	1683	....	*2.6*
[14]New York school children, 1907	....	....	*10*	....	....	*10*					
[15]Baltimore school children	9295	750	*8*	9295	640	*7*					
London school children	1521										
[16]Islington schools: Slightly enlarged	....	441	*29*								
[16]Islington schools: In need of operation	....	152	*10*								
[16]Islington schools: In urgent need of operation	....	45	*3*								
Paddington Technical School	....	....	....	....	....	....	182	....	....	9	*7*
Philadelphia high-school girls (see Chart 5)	462	182	*28*	462	37	*8*	462	....	....	27	*6*
	Hypertrophied tonsils or nasal obstruction or both.										
	Number examined.	Found defective.	Per cent.								
[17]Edinburgh school children	600	302	*50*				597	218	40	258	*42*
[17]Aberdeen school children	625	187	*30*				600	78	5	83	*14*

[12] Children tested with the McCallie audiometer. Ears tested separately. See page 586.

[13] New York Health Report, 1906 (7375 cases of postnasal growth appear to be included in the 8974 cases of defective nasal breathing).

[14] See Journal of the American Medical Association, Nov. 16, 1907.

[15] Baltimore Health Report, Oct., 1907.

[16] Report of London County Council, 1907; ages of children are 3 to 13.

[17] See McKenzie's "Medical Inspection of School Children."

Table Showing Prevalence of Nose, Throat, and Ear Defects under Special Social and Sanitary Conditions and among the Mentally Deficient.

	Hypertrophied tonsils.			Nasal obstruction.			Defective hearing.				
	Number examined.	Found defective.	Per cent. found defective.	Number examined.	Found defective.	Per cent. found defective.	Number examined.	Slightly deaf.	Marked deafness.	Total number defective.	Per cent. found defective.
Philadelphia school children (see Chart 1):—											
Middle-class Americans	1592	97	*6*	1592	40	*2.5*	1592	....	....	87	*2*
Poor immigrants	847	78	*9*	847	91	*11*	847	....	....	17	*2*
New York City Seashore Sanitarium (see Chart 6)	1346	186	*13*	1320	89	*6*	1144	....	....	52	*4*
[20]Philadelphia private school (boys of good social station)	297	45	*15*	297	12	*4*	297	25	6	81	*10.5*
[21]Leipzig school children	....	....	....	9031							
Burgeschulen (better class)	....	....	....	....	....	*18.9*					
Bezirkeschulen (poor class)	....	....	....	....	....	*25.5*					
Philadelphia school children:—											
Dull children (see Chart 7)	174	11	*6.5*	174	40	*23*	174	....	7	....	*4*
Delinquent children (see Chart 8)	....	....	*8*	....	....	*28*	....	....	....	....	*2*
Feeble-minded children (see Chart 8)	....	....	*9*	....	....	*50*	....	....	....	....	*7*
[19]London school children (mentally defective)	....	....	....	....	....	....	500	....	....	60	*12*
[22]New York school children (mentally defective)	....	....	....	....	....	....	515	....	....	71	*14*

	Hypertrophied tonsils or nasal obstruction or both.			Defective hearing.				
	Number examined.	Found defective.	Per cent.	Number examined.	Slightly deaf.	Marked deafness.	Total number defective.	Per cent. found defective.
[18]Baltimore school children (poor class):—								
In old, unsanitary building	840	207	*24.5*					
In good, new building	....	....	*11*					
[19]London school children (very poor):—								
The Hanwell, Latimer Road, and Lambeth Schools	894	406	*45.5*					
Five East End schools	....	....	....	1006	....	....	73	*7.2*

[18] "Report on Two Schools, Children Living under Different Sanitary Conditions," by Dr. J. Hall Pleasants, New York Medical Journal, Jan. 11, 1908.

[19] Report of London County Council, 1907.

[20] "Examination of the Noses, Throats, and Ears of 297 Boys in the William Penn Charter School," by Dr. W. B. G. Harland and Dr. G. W. Stimson, Journal of the American Medical Association, May 18, 1907. (The report states that the proportion of hypertrophied tonsils in the lowest grades is 28 per cent. and in the highest grades 8 per cent.)

[21] William H. Burnham, in the Pedagogical Seminary, June, 1908 (quoted).

[22] Medical News, 1906, p. 1918.

The influence of age on the acuity of hearing was shown by this investigation to be practically negative, at least during the period of school life. The hearing, tabulated per age, was:—

6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.	15 yrs.
87	88	90	92	90	91	85	90	93	92

The reason for the low average at the age of 12 was because of a case of extremely defective hearing (both ears) in one of the children tested. The comparatively small size of the series made this exceptional case show itself in the statistics.

The Prevalence of Discharging Ears.

The prevalence of chronic ear discharge may be estimated in round numbers at 1 or 2 per cent. in the lower grades. This estimate, however, is that of the medical inspector having opportunity for but one examination, and that a casual one. The reports of the specialists show a much higher percentage, and the condition actually exists in considerable frequency among the children of the poor, who, as we have seen, are afflicted with adenoids, which favor the ear inflammation. Thus, in 100 children in the Ninth Primary School of Philadelphia, the writer found 4 cases, all small children. In McKenzie's "Medical Inspection of School Children," it is stated that an examination of Edinburgh school children showed otitis media and perforation existing in 15 cases (2.5 per cent.). There was dry perforation in 8 cases (1.3 per cent.). Cicatrices indicating previous suppuration existed in 10 cases (1.7 per cent.).

The report of the London County Council, 1907, states that the examination of 132 boys in the Paddington Technical Schools showed 4 cases of discharging ears. An examination of 1000 school children in the Hanwell district schools, containing very poor children, showed chronic middle-ear suppuration in 88 cases (8.8 per cent.). Past suppurative middle-ear trouble existed in 247 cases (24.7 per cent.). The report also states that an examination, by Miss Ivens, of 1006 poor children in 5 East End schools showed chronic suppuration to exist in 73 cases (7.3 per cent.). Dry perforation of the eardrum existed in 42 children (4.2 per cent.), and cicatrices indicating previous discharge in 134 children (13.4 per cent.).

Illustrative of the findings of a specialist is the report of Harland and Stimson, which in 20 of 297 boys between the ages of 8 and 19, pupils at the William Penn Charter College Preparatory School, showed purulent discharge to be either a present or a past condition in 31 cases (10.43 per cent.). The proportion among the younger children was 15 per cent., decreasing steadily as the examination progressed to the older boys, where it is recorded as 4 per cent. It should be remembered that these figures include not only those cases in which an evident purulent discharge exists, but a greater number of cases in which are found dry perforation and healed drum membranes, showing by their scars that discharge and subsequent healing have taken place.

The Prevalence of Carious Teeth.

Owing to neglect, decayed teeth may be found in school children of every age. Particularly between the ages of 7 and 11 is dental decay a characteristic condition, and three-fourths of all school children are shown by reports to possess from 1 to 10 carious teeth.

It is not uncommon for the school physician to find all of 10 or 15 children successively examined to have one or more decayed teeth. I have at hand two memoranda noting instances of this, one at the Todd School and the other at the Fletcher School of Philadelphia. An instance comes to mind in which a school nurse at the Fletcher School, who had been instructed to take 15 children to a dental dispensary, had forgotten the matter till the last moment and appealed to the inspector to furnish the material. The principal was asked to send up a class of third-grade children, and the 15 cases of carious teeth were found in the first 23 children examined.

The following reports on the teeth of school children may be quoted:—

New York City School Children (see Chart 4), 164,250 cases of decayed teeth out of 266,426 children examined (61 per cent.).

Summer School of Observation. University of Pennsylvania, 1909 (see Chart 3), 60 cases of decayed teeth out of 156 children examined (38.5 per cent.). Chart 3 also gives a table

showing the prevalence of decayed teeth by grades (roughly by age). In the second, third, fourth, and fifth grades over 50 per cent. of the children showed defective teeth. In the sixth, seventh, and eighth grades the number diminished to 25 per cent.

New York City Summer Sanitarium at Sea Breeze, L. I. (see Chart 6), 974 cases of decayed teeth out of 1343 children examined (72 per cent.).

High-school Girls.—It is interesting to note that the number of decayed teeth is proportionately less among high-school pupils than among grammar-school children. This is doubtless due to selective action (the high-school pupils being of better social class), since the permanent teeth, with the exception of the wisdom teeth, are all in the mouth by the end of the thirteenth year, and are naturally more liable to decay with the increase of age. Thus, the girls in the William Penn High School, Philadelphia (see Chart 5), showed only 10 per cent. of decayed teeth.

Philadelphia School Children (poor).—Chart 2, which shows the prevalence of physical defects among elementary school children of the poor immigrant class, may be taken as showing figures slightly below actual conditions. The general average here shows decay in 33.5 per cent. of the children. It should be stated in this connection that children who presented single decayed teeth apparently ready to fall out were passed over as cases for which it was hardly worth while to issue notices to parents. (The defects noted in Philadelphia are only those for which such notices are issued plus important permanent defects.) The variations by grades are shown also in Chart 2.

City of London (Report of the London County Council, 1907).—The examination of 700 young children of poor social station revealed the fact that 680 (97 per cent.) possessed decayed teeth. Of these 680 children, 205 possessed 2 decayed teeth, 152 children possessed 3 to 5 decayed teeth, and 323 children possessed 6 or more decayed teeth.

Among these were found one child with 11 decaying stumps, another with 14, and another with 17. One girl had but 2 teeth. One boy possessed not a single sound tooth.

Another study was made designed to show the conditions existing in older school children. An examination of 132 boys

showed 62 per cent. with two or more carious teeth. An examination of a large number of girls revealed decayed teeth in 37 per cent. of them. In another series of boys and girls, 43 per cent. of all children possessed one or more decayed teeth.

City of Edinburgh (Quoted from McKenzie's "Medical Inspection of School Children").—A careful examination of 591 children showed that not more than 25 per cent. cleaned their teeth, and that only 5 per cent. used the toothbrush daily. Of the whole 591 children the teeth were regular in 67 per cent., and very irregular in 5.5 per cent., the remainder being fairly regular. Six per cent. of the whole number of children possessed badly decayed teeth. Decayed first teeth were found in 571 children (96 per cent. of all), and decayed permanent teeth in 110 children (19.4 per cent. of all). Many children, of course, were counted in both groups of cases. The children with decayed first teeth averaged 4.95 decayed teeth each, and those with decayed permanent teeth averaged 2.5 decayed teeth per child.

City of Aberdeen (Quoted from McKenzie's "Medical Inspection of School Children").—The examination of Aberdeen children was made purposely along the same lines as in Edinburgh, and the results are, therefore, comparable. Six hundred children were examined. Of these, 12 per cent. used a toothbrush daily. Three per cent. presented markedly irregular teth, and the teeth of 5 per cent. were much decayed. In the recording of decay no distinction was made between temporary and permanent teeth, but separate records were made for the younger and for the older children. Thus, in the youngest children 33 per cent. exhibited decayed teeth. In the children over 9 years of age 80 per cent. possessed decayed teeth. As to the number of teeth diseased, the average was 2 carious teeth for each (defective) child under 9 years of age, and 3½ decayed teeth for each child 12 to 15 years of age.

Influence of Age on the Prevalence of Decayed Teeth.—In our present generation of dental neglect through childhood years, the age factor is so powerful that it should be especially mentioned. After the appearance of the first permanent tooth at the age of 6 years, the temporary teeth are in the process of nature successively dropped from the mouth until the ninth year sees the last one discarded and replaced by the perma-

nent second bicuspid. At this time all the permanent teeth have appeared except the 12- and 18- year molars, and so the child of 10 years is provided with 24 teeth none of which is more than three or four years old. So many slum children who at the age of 7 possessed 6 or 8 rotting teeth will now present an absolutely healthy mouth. Nowhere in my own experience was this more impressively demonstrated than in the case of the two small boys with bad teeth shown in the chapter on the Teeth. Two years after the picture I met one of them outside the school and recognized him because he saluted me. He opened his mouth upon request, one might say for old times' sake, and exhibited a set of perfect teeth.

Theoretically the number of decayed teeth should decline from the seventh to the eleventh year, and then again slowly increase as the permanent teeth begin to show decay. Practically there is no secondary increase because the children in the upper grades represent a better social class by process of elimination and also go to the dentist. Illustrative of this decrease as age (and, therefore, grade) increases are the grade figures furnished by Charts 2 and 3. In Chart 3 the percentages are already worked out. In Chart 2 the 305 children of the second and third grades showed 127 cases of decayed teeth (41 per cent.); the 154 children of the fourth grade showed 52 cases (33.7 per cent.); the 188 children of the fifth and sixth grades showed 50 cases (26.6 per cent.), and the 200 children of the seventh and eighth grades showed 21 cases (10.5 per cent.). The reader can see by reading Chart 2 that among the 305 children in the second and third grades 18 possessed 7 or more decayed teeth.

Prevalence of Nervous Disorders.

The number of nervous children found in the schools is stated very differently in these reports. A moment's reflection on the circumstances attendant on the gathering of the statistics will readily show the reason for this variation. The medical inspector who sees a child for only four or five minutes will frequently detect nervousness by the husky voice, explosive utterances, tremulous lips, and overquick actions. He will be helped in the diagnosis also by the condition of poor nutrition or

anemia which so often coexists. It is evident, however, that such a short interview reveals only a fraction of the nervous children. Thus, Chart 1 gives 1.5 per cent. among the better class of American children, 4 per cent. among the poor American, and 4 per cent. among the Italian and Jewish children in the poor quarters of the city. Chart 3 states that 2 per cent. among the children in the Summer School of Observation of the University of Pennsylvania are nervous. Chart 4, which gives chorea cases, states but 4 per cent. At the University of Pennsylvania Summer School in the session of 1910, a definite census was made by Dr. Brumm, who assisted the writer in the medical inspection work. The teachers collaborated. Of 131 children examined 27 (or 20 per cent.) showed nervousness (16 irritable nervousness, 6 apathetic nervousness, and 5 chorea).

At the Seashore Sanitarium for Poor Children at Sea Breeze, Long Island, one-third of whose charges were recorded as poorly nourished, the proportion of nervous children was 9 per cent. (see Chart 6).

Careful observation of school children reveals much higher figures. The most trustworthy of these at hand have just been furnished upon request by the principals of four elementary schools. Here it will be noticed that nervousness in some degree existed in 14 per cent. of the primary boys, in 11 per cent. of the primary girls, in 8 per cent. of the grammar boys, and in 4 per cent. of the grammar girls.

The table given below, based on the teachers' observations, shows two remarkable facts. The first is that more boys than girls are noted as nervous; the second, that the proportion of nervous children is much higher in the lower grades. The latter appears contrary to the view often expressed by teachers and physicians, that school life is the cause of nervousness in children. There is really nothing irreconcilable in the two statements. The explanation is that nervousness is very prevalent among the mentally deficient and the malnourished children of the poor, and such children drop out of school before reaching the grammar grades. This point is emphasized by the report of a special class in the Miller School (not included in the table). This class contained 17 boys and 10 girls, most of them feeble-minded, some backward, their ages varying from 7 to 13

Prevalence of Nervous Children in the Elementary Schools as Ascertained by Means of an Inquiry Conducted by the Principals of the Burk, Claghorn, Mil er, and Mt. Vernon Schools, Philadelphia. (Miss Elizabeth McGuire, Mr. Albert Dudley, Miss Louise Eissler, and Mr. Geoffrey Buckwater.)

BOYS.

Grade.	No. children.	Slightly nervous.	Per cent.	Very nervous.	Per cent.	Total.	Per cent.
1	435	33	*7.5*	15	*3.5*	48	*11*
2	267	23	*8.6*	10	*3.7*	33	*12.3*
3	268	10	*3.8*	23	*8.5*	33	*12.3*
4	261	36	*13.8*	18	*6.9*	54	*20.7*
Average primary...	....	......	....	......	....	......	*14*
5	283	12	*4.2*	12	*4.2*	24	*8.5*
6	233	13	*5.6*	4	*1.7*	17	*7.3*
7	161	11	*6.8*	2	*1.2*	13	*8*
8	110	4	*3.6*	4	*3.6*	8	*7.3*
Average grammar..	....	......	....	......	....	......	*8*
Totals....	2018	142	*7*	88	*4.4*	230	*11.4*

GIRLS.

Grade.	No. children.	Slightly nervous.	Per cent.	Very nervous.	Per cent.	Total.	Per cent
1	421	26	*6.2*	10	*2.4*	36	*8.5*
2	284	22	*7.7*	9	*3.2*	31	*10.9*
3	283	14	*4.9*	6	*2.1*	20	*7*
4	243	33	*13.6*	17	*6.9*	50	*20.5*
Average primary...	....	......	....	......	....	......	*11*
5	244	16	*6.6*	7	*2.8*	23	*9.4*
6	204	9	*4.4*	2	*1*	11	*5.4*
7	160	6	*3.7*	2	*1.3*	8	*5*
8	80	3	*3.7*	3	*3.7*	6	*7.5*
Average grammar..	....	......	....	......	....	......	*4*
Totals....	1919	129	*6.7*	56	*2.9*	185	*9.6*

years. Of the 17 boys 5 were slightly nervous and 4 very nervous. Of the 10 girls 1 was slightly and 4 very nervous. Of the 27 children in the class, 14 were in some degree nervous.

Adolescence, which occurs at about the age when children pass from the grammar to the high school, brings with it a period of high nervous instability, and every high-school teacher of girls is familiar with hysterical attacks, fainting spells, and periodical absences. The figures furnished by Dr. Richards in Chart 5 (18 per cent. of the girls in the freshman class of the William Penn High School for Girls are stated to be nervous) are, however, remarkably high. It is probable that they express a very searching scrutiny, and that the number includes many girls who were temporarily frightened by the physical examination, which was thorough.

In Warner's book on the "Study of Children," elaborate tables are given. These tables appear not unreasonable, but the examination appears to have been so cursory in character (the author states that they are based on 50,000 children seen in the years 1892-94) that the writer feels that they are not backed by sufficient proof to warrant quotation.

Among the dull, the backward, the feeble-minded, and the difficult children the percentage of nervousness is extremely high, indicating a generally unstable nervous system. In Chart 8 the percentage of nervous boys among the pupils in the truant school is given as 2 per cent. These figures do not express even approximately the truth. They refer to cases of nervous exhaustion. Every teacher knows that of such boys at least one-half are high strung, ill disciplined, quarrelsome, and given to outbursts of temper. It is not uncommon for such boys to fly into fights with others as they pass through the aisles of the class.

Among the feeble-minded cases recorded in Chart 8 the proportion of nervous children is given as 12 per cent. The physical examination of all the children of this group was made personally by the writer and represents all those detectable by a close scrutiny extending over twenty or thirty minutes in each case.

The number of children suffering from epilepsy is difficult to determine, since many epileptic children are permanently feeble-minded and only incidentally epileptic. Other epileptic

children do not attend school, and some are wrongfully classed as epileptic because of the occurrence of single fainting spells or epileptic seizures. In the course of six years I have seen probably 15 or 20 epileptics in the schools. The only figures at hand bearing on the subject are found in the report of the National Educational Association for 1908, a contributor stating that 300 epileptics not mentally deficient were found in the schools of London.

Prevalence of Orthopedic Defects.

The frequent orthopedic defects encountered in school children are stoop shoulders and lateral curvature.

Prevalence of Stoop Shoulders.—This condition in the case of children is practically synonymous with flat chest, since the only cases of pronounced stoop shoulders associated with fair or good chest development are those whose possessors have acquired the stoop in adult life from certain occupations.

A review of the general charts (1 to 6) shows that inspectors, as a rule, do not pay much attention to this most important defect, for but few cases are recorded. There is an unfortunate idea that chest development is the physical instructor's province entirely. Such cases as are reported by school physicians are loosely classed with other orthopedic defects in a general group.

The writer, in his investigation of the subjects of adenoids and mental deficiency, had occasion to note the frequent existence of stoop shoulders in the mentally deficient and in children suffering from adenoids, defective hearing, defective vision, and poor nutrition. For this reason Chart 2 contains an accurate list of the number of cases of *pronounced* stoop shoulders and flat chest occurring in the Mt. Vernon Grammar School. In the second and third grades there were 7 cases out of 305 children examined; in the fourth grade, 3 out of 154 examined; in the fifth and sixth grades there were 5 out of 188 examined; in the seventh and eighth grades there were 11 out of 200 examined. This equals about 3 per cent. There were two or three times this number who would be noted as somewhat flat chested upon close inspection.

Prevalence of Lateral Curvature or Scoliosis.—The school inspector in America does not record many cases of lateral

curvature because with the clothing on only pronounced cases can be detected. In Chart 2, covering 847 children, the writer failed to record any case whatever. (In excuse for this apparent oversight it may be noted that the Philadelphia inspectors are generally instructed to concentrate their attention upon remediable defects.) There were doubtless several cases easily noticeable, and there is at hand a photograph of one case from among these children. The 156 children at the Summer School of the University of Pennsylvania (see Chart 3) yielded one case. Charts 4, 5, and 6 mention orthopedic defects in lump and are, therefore, not quotable here.

Evident lateral curvature is much more plainly seen in adults than in children. One has but to walk slowly down a crowded street and study the backs of those in front to see any number of people, particularly men, carrying one shoulder higher than the other, and wearing a coat sagging on one side of the neck and shoulder. Any tailor or dressmaker will testify that a large proportion of all persons require padding in one shoulder in order to present a symmetrical form.

The observations of orthopedists and physical instructors made on subjects undressed for the sake of careful scrutiny show one-fourth to present some degree of spinal curvature. It should be remembered that these figures, while true and indicative of unhygienic causative conditions, nevertheless show most cases to be of slight degree. We may quote from the findings of Combe,[1] of Lausanne, Switzerland:—

Combe notes the fact that at about 12 years there is an

---

[1] "The Requirements of Proper School Furniture," by Robert W. Lovett, School Hygiene, Oct., 1908. Also "A Continued Study of Pupils' Attitudes," by Lillian M. Towne, American Physical Education Review, March, 1902. (Dr. Lovett attributes the Lausanne figures to Scholder; Miss Towne to Combe.)

Total number children examined........ 2314

Total number cases lateral curvature..... 571, or 24.7 per cent.

In the different grades the figures were as follows:—

	Per cent.
Grade 1 there were	*8.7*
" 2 " "	*18.2*
" 3 " "	*19.8*
" 4 " "	*27.2*
" 5 " "	*28.3*
" 6 " "	*36.4*
" 7 " "	*31.0*

arrest of the prevalence of scoliosis. The separate tables for boys and girls show 23 per cent. for boys (297 out of 1270) and 26.7 per cent. for girls (274 out of 1024). The tables of Krug, of Dresden, also show the practical correspondence in boys and girls. In the boys it was 26 per cent. (181 cases out of 695 examined); in the girls 22.5 per cent. (163 cases out of 723 examined).

Other European figures are those of Hagman, of Moscow, who found in 1664 children 29 per cent. scoliotic; Guillaume, of Neufchatel, in 731 children 29 per cent.; Kallback, of St. Petersburg, in 2333 children 26 per cent. Thus, approximately 27 per cent. of school children have various degrees of lateral curvature.

Figures on Canadian children are presented by Dr. R. Tait McKenzie[1]:—

In a series of examinations, covering a period of four years in the Montreal High School, of boys varying in age from 13 to 18 and averaging a little over 15 years, I have been struck by the number that presented some marked irregularity of growth, and on tabulating them I find that 20 per cent. of all those examined have a marked lowering of the right shoulder, 3 per cent. have the left low, scoliosis was found in 2 per cent., lordosis marked in 5 per cent., and round shoulders in 3 per cent.; while the habitual standing position of 30 per cent. approaches more or less closely to what Bernard Roth has aptly named the "gorilla type"—abdomen protruded, chest flat, and head shoved forward.

These defects are found not among school boys alone, for out of 500 college students of the athletic class examined at McGill 12 per cent. showed these same defects, varying from slight unevenness of the shoulders to marked scoliosis. In an examination of 54 students of the Royal Victoria College for Women during the past year, I found 19 presenting some marked deviation from the normal, 11 having right shoulder low, and in 4 others well-marked scoliosis—8 girls complained of persistent backache.

The Prevalence of Poor Nutrition.

The prevalence of poor nutrition varies demonstrably with social class, age, and mental development. Doubtless other factors, such as a rich, improper diet, overstudy, and lack of exercise, affect the nutrition, but no statistics are at hand.

[1] "The Influence of School Life on Curvature of the Spine," Montreal Medical Journal, Feb., 1902.

Since height, weight, blood, vascular tension, and tissue quality all determine the grade of nutrition, it follows that a simple accurate and comprehensive definition of this condition is impossible. Good nutrition insensibly shades into fair nutrition, and fair nutrition shades off into poor nutrition. The personal equation, therefore, figures in every examiner's results, and if he be compelled to group all his cases into "good" and "poor" his results may be at striking variance with those of others examining the same children. This is the natural explanation of the discrepancy between the reports of medical inspectors and experienced social workers, on the one hand, and special investigators without experience, on the other. The former have become accustomed (hardened possibly) to slum conditions and note only the worst cases. The latter are shocked at evidently low general standard and base their judgment on a comparison with well-fed American children.

(*a*) Prevalence of Poor Nutrition According to Medical Inspectors' Reports.

Here will be found minimum figures because medical inspectors, as a rule, note only defects for which parents' notices are issued. These minimum figures gathered in the course of routine work *approximate 5 to 6 per cent.* Thus, Chart No. 1 gives 2 per cent. for Americans of the better class, 7 per cent. for poor American children, and 4 per cent. among the poor Italians and Russian Jews. Chart 4, covering many thousand New York children, gives 3 per cent. of poor nutrition cases. Chart 3, reporting the condition of the children in the Summer School of Observation of the University of Pennsylvania, session of 1909, gives 4.5 per cent. cases of malnutrition. The succeeding year my colleague, Dr. Seth A. Brumm, made these examinations and reported 3.9 per cent. cases of poor nutrition, together with 17 per cent. cases of fair nutrition. These children were of fair social station and in all the elementary grades (one class of each).

(*b*) Prevalence of Poor Nutrition (Average American Children) Based on Weight and Height per Age.

Diagnosis resting altogether on a mechanical basis is not surely correct, since some people are naturally thin, and, on the other hand, others are heavy, but flabby and unhealthy. These exceptional cases, however, tend to counterbalance in a statistical study, and the method does away with the personal bias of the examiner. A dirty face and a clean one look alike to a set of scales.

Such an investigation was made in 1907, in the Claghorn Grammar School, Philadelphia, by the writer. Occasion is here taken to acknowledge the kind assistance of Mr. Albert E. Dudley, Miss Reba Riegner, and Mr. Charles Barth in the looking up of school records, classifying of cases, and weighing and measuring of children. Three hundred and fifty-eight boys whose ages ranged from 9 to 15 years were weighed and classified in three groups. The middle group (Class B) comprised those boys whose weight per age corresponded to the standard figures of the Metropolitan Life Insurance Company, or within one year's variation of the same. The boys of heavier weight per age constituted Class A, and the boys of less weight per age (supposed to be the poor-nutrition cases) constituted Class C. The same procedure was followed in the case of the girls. (Note that these were all fifth- to eighth- grade children.) The summary showed:—

	Boys (358)	Girls (225)
Class A, heavy weight for age	120	97
Class B, medium weight for age	168	100
Class C, light weight for age	70	28

A second analysis was made in which *the height as well as the weight* was used as the index of nutrition. According to height, three groups were devised. The middle group, Y, comprised those boys whose height per age corresponded to the standard figures mentioned, or within one year's variation of the same. The boys of greater height per age constituted Class X, and the boys of less height per age constituted Class Z. The same procedure was followed in the case of the girls.

Now, the extra heavy children were those classed in both A and Z; the heavy in AY and BZ; the medium (normal relation of height and weight) in AX, in BY, and in CZ; the light weight children (*fair nutrition*) in BX and CY; and the extra light weight children (*poor nutrition*) in CX. This second method of classification showed the number of children in each group:—

	Boys (358)	Girls (225)
Extra heavy prop. to height (AZ)	0	0
Heavy prop. to height (AY and BZ)	24	9
Normal relation (AX, BY, CZ)	198	123
Light weight prop. to height (BX, CY)	123, or 37.4% (fair nutrition)	82, or 36.4%
Extra light prop. to height (CX)	13, or 3.6% (poor nutrition)	11, or 4.9%

(*c*) Special Reports on Prevalence of Poor Nutrition among the Poorer Classes.

In Chicago, in 1908, Dr. MacMillan, of the Child Study Department, and Mr. Bodine, of the Compulsory Education Department, investigated the number of malnourished children in a typical poor district in the city. Under their direction 10,000 children were examined. The *Survey,* October 17, 1908, quotes from the report:—

"Of the 10,000 children examined there were picked out 1123 necessitous cases, or approximately 11 per cent. Discounting these figures 30 per cent., there were in these 12 schools approximately 7.8 per cent. who were actually necessitous." Then follows an estimate of 4666 school children in Chicago "who are daily attending school without sufficient nourishment." There is some confusion of the terms "necessitous" and "poorly nourished," and the reason for discounting the actual findings 30 per cent. is not clear. This report appears to be the best so far furnished on the nutrition of the children of the poor in a large American city. In the nature of things these children were mostly those of the foreign poor,—Italians, Russian Jews, and Poles. The relation of the health condition to the home condition as shown in this and other reports is discussed in the chapter on Nutrition.

Very interesting was the controversy in New York City[1] during the years 1905-1908 as to the number of poorly nourished school children in the city. A statement made without proof, that 70,000 children went breakfastless to school every morning, aroused philanthropists to urge free school lunches and made fine subject-matter for the newspapers. The four great organized charities stated that they were able to take care of all cases of destitution, and that if children were hungry they would relieve both children and parents. An investigation made by order of the Board of Education showed that cases of actual destitution were few and practically all of these were being relieved. The main point which appears to have been missed in the heat of partisan argument is that nine-tenths or more of the flabby children of the foreign slum district get food regularly, but it is coarse bread, cakes, cheap fish, and coffee, of poor nutritive quality. The question of school meals for these children may safely be argued on the primary assumption that a general change in home conditions by any effort of private agencies is impossible. Such a general improvement can be effected only by an increase in wages totaling millions, and, therefore, the result of changed economic conditions.

The figures given in Chart 6, describing the condition of the poor children at the Sea Breeze Sanitarium, cannot be used for general conclusions. These children, 35 per cent. of whom were poorly nourished, were at Sea Breeze for the very reason that they were in this unhealthy condition.

---

[1] An interesting series of articles appeared in *Charities and the Commons* (now the *Survey*), to which the reader is referred for further information. Some of these are: "The Feeding of the School Children" (June 13, 1908); "The Children's Lunch Room" and "Feeding the School Children" (June 20, 1908); "The Underfed Child in the Schools" (June 27, 1908); "Chicago's Hungry Children" (October 10, 1908); "The East Side and the Late Panic" (July 4, 1908), and "School Board Finds Few Hungry Children" (October 24, 1908). In New York City the great charity organizations who have shown interest in this question are: "The Charity Organization Society of New York"; "The Association for the Improvement of the Condition of the Poor," and the "United Hebrew Charities."

(*d*) Influence of Social Condition, Age, and Mental Development upon the Nutrition.

Social condition is the most powerful influence affecting nutrition, since poverty means poor food and usually implies ignorance and neglect.

Poverty in large American cities is seen mostly in the foreign quarter, peopled by southern Europeans of the lower class. The association of these immigrants with poverty and malnutrition, however, is not a racial, but a social, matter. They are ill nourished because they are poor and ignorant, not because they are of Italian, or Russian, or Jewish, or Armenian blood.

The remarkable difference between the condition of the American poor and the foreign poor is not adequately shown by statistics. Among the better class Americans the poorly nourished children originate from miscellaneous causes other than inability of the parents to supply good food. Rich food, lack of exercise, and late hours are here the principal factors. Among the poor but respectable Americans the same holds true except that the causative factors are usually coffee and fried meat. Among the lowest Americans in the tenderloin sections where neglect and drunkenness are common, the most extreme cases of poor nutrition are found, and the majority of the children are ragged, dirty, and half fed. Luckily such districts are small and in Philadelphia are exemplified in only one school, and partly in two or three others. In this school just mentioned I am told by Miss Boughton, who has charge of the school lunches, that the crumbs and crusts are picked up and eaten. Among the foreigners (Russian Jews, Italians, and Poles) most of the children are pale, flabby, and slightly undersized. On the other hand, few cases of emaciation with active hunger exist. These people, each in his own race, help each other in times of distress, and cheap food, poorly cooked, is the cause rather than absolute lack of food. Under such conditions, evident to the most casual observer, an investigator may report 10, 30, or 50 per cent. of the children as poorly nourished according to his viewpoint.

Influence of Age.—The only statistics available are those of Dr. MacMillan and Mr. Bodine, of Chicago, already mentioned in a preceding paragraph. The 1123 poorly nourished children

in the Chicago district of poverty were found mostly in the lower grades. "Among children of kindergarten age the percentage of underfed was 15.9, and for grades one, two, three, four, five, and above the percentages respectively were 13.8, 11.2, 9.6, 9.0, and 5.9, showing a gradual decrease in numbers as we go up the grades."

Whether the poorly nourished children drop out of school or pick up in health as they grow older because of ability to digest coarse, poor food is not certain. Only a record of the condition of the children leaving school will settle this point. Even assuming that health improves with age, the physical damage and mental starvation experienced early in life leave their effects.

Mentally deficient children show a much poorer nutrition than average children.

Among the feeble-minded this is principally an indication of degeneracy, the whole make-up being defective. In Chart 8 it is shown that 32 per cent. of the feeble-minded cases there described showed poor nutrition.

Among the dull and backward children poor nutrition is often the cause of the condition. In the special classes for deficient children in the poor Italian section of Philadelphia all that the majority of these children need is a decent home and good food. They are starved into inanition. Even among the dull children of the respectable class, the proportion of poorly nourished children is high. Thus, in Chart 7, which records American children of fair social station, 12.6 per cent. of the boys and girls in four special classes were poorly nourished.

Truant Boys—Disciplinary Cases.—Since this class of boys shows mental deficiency in definite degree, poor homes, and often poor heredity, we are not surprised to find that they are usually undersized and of only fair physique. Chart 8 states that 8 per cent. are poorly nourished. The term was used by the writer when making these examinations to mean *evident* poor nutrition.

Prevalence of Mental Deficiency.

The proportion of the feeble-minded to the population of the community has been discussed in the chapter on Mental Deficiency. Here is presented the result of the Philadelphia

school investigation by the writer and Dr. Oliver P. Cornman there mentioned.[1]

Table Showing Prevalence of Mental Deficiency by Teachers' Reports. (Philadelphia Investigation.)

Number School Population		Class 1 Feeble-minded Institution		Class 2 Truant, Incorrigible, etc. (Low Mentality)		Class 3 Truant, Incorrigible, etc. (Fair Mentality)		Class 4 Backward (Special Class Cases)		Class 5 Dull (Above Class 4)	
Gram.	Primary	B	G	B	G	B	G	B	G	B	G
6648						2	0	11	19	14	54
9908		0	5	8	0	9	0	25	15	106	128
14706		1	2	4	0	75	2	43	60	328	246
19182		7	8	15	0	183	8	110	85	396	446
	23415	20	18	52	14	248	9	212	135	484	542
	29436	41	18	87	19	280	11	352	196	670	656
	27546	61	40	137	24	208	12	564	288	781	561
	29976	157	74	89	18	82	7	540	271	793	609
50889		8	10	22	0	269	10	189	179	684	874
	107878	279	145	365	60	818	39	1668	884	2678	2367
50889		18		22		279		368		1568	
	107878	424		425		852		2552		5045	
157762		442		447		1181		2920		6608	
157752		11548									

This statistical table is instructive, showing, as it does, a small proportion of the mentally deficient in the grammar grades. Those in the grammar grades noted as feeble-minded were doubtless pushed up in order to give them the association of older children rather than with the idea of teaching them grammar work. The fact that 447 of the 1578 "truant and incorrigible" children were stated to be of decidedly low mentality bears out the results of the special study of truant boys given on pages 434-436. Finally, the practical finding that some 5000 of the 167,000 children in the elementary schools (viz., groups 1, 2, 3, and 4) were stated by their teachers to absolutely require special instruction is a most important feature of this investigation.

1 See the *Survey* for July 10, 1909; "Annual Report of Superintendent of Schools, Philadelphia, 1909"; "Special Report on Backward Children Investigation, 1911." The *evidently* feeble-minded, upon subsequent careful investigation, were found to number about 250.

INDEX.